TRANSACTIONS

OF THE

Massachusetts Horticultural Society,

FOR THE YEAR 1895.

PART I.

BOSTON:
PRINTED FOR THE SOCIETY.
1896.

☞ SEE LAST PAGE OF COVER.

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The following papers and discussions have been circulated to some extent in the form of slips reprinted from the reports made by the Secretary of the Society in the Boston Transcript. As here presented, the papers are printed in full, and the discussions are not only much fuller than in the weekly reports, but, where it appeared necessary, have been carefully revised by the speakers.

The Committee on Publication and Discussion take this opportunity to repeat what they have before stated, that the Society is not to be held responsible for the certainty of the statements, the correctness of the opinions, or the accuracy of the nomenclature in the papers and discussions now or heretofore published, all of which must rest on the credit or judgment of the respective writers or speakers, the Society undertaking only to present these papers and discussions, or the substance of them, correctly.

J. D. W. French,
C. Minot Weld,
B. M. Watson, Jr.,
Committee on Publication and Discussion.

TRANSACTIONS

OF THE

Massachusetts Horticultural Society.

BUSINESS MEETING.

SATURDAY, January 5, 1895.

A duly notified stated meeting of the Society was holden at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair.

This being the commencement of the term of office of the new board of officers and standing committees, the President delivered the annual address as follows:

ADDRESS OF PRESIDENT KIDDER.

It is a custom of long standing for the President of this Society to say a few words at the first meeting in January. A pleasant custom, for then is an opportunity given to state what has been the tone of the year passed, and to express hopes and plans for the year just beginning.

We have just had a period of unusual anxiety. So well is this known, alas, that I need not have mentioned it. A good deal of daring would have been necessary to recommend any radical measure in the way of getting our long-coveted more commodious quarters. There seems at present very little promise of a material improvement in financial matters, and careful and cautious should still be our actions.

I told you last year that your Chairman needed a year to find out what the Society wanted, and that after that a second year was not any too much for carrying out what he found it desirable to do. It was gratifying to me to learn that you wanted me for another term, and I take this opportunity to thank you for the confidence you have shown in me.

In a matter of such moment as increasing the capacity of a Society like this, for that is what we want to do — not merely to

carry on the routine business, deliberation is, it seems to me, as important as push. We might easily buy a piece of land larger than this we now own, put up a building which we should find much more convenient than this, and at the end of two or three years find that we were not in the right place, and had not enough room after all.

This summer it became necessary to replace the boiler, and this was done as thoroughly as if we were to stay here forever. The entire cost was, however, but little over eight hundred dollars. Very few other repairs have been needed. This coming summer it will be necessary to do a great deal of repairing to the roof.

Perhaps my remarks have sounded as if I did not favor our moving, but I do most emphatically believe we should move, only not until we find the right place. And I think your Committee will find it yet.

On motion of Ex-President Spooner, it was voted, that the President be requested to furnish a copy of his address for publication.

The appropriations for Prizes and Gratuities, recommended by the Executive Committee on November 3, and then laid over until this meeting, came up for final action and were voted, as follows:

For Prizes and Gratuities:

For Plants, ...	$2,000
For Flowers, ...	2,500
For Fruits, ...	1,800
For Vegetables, ...	1,150
For Gardens, ...	500
And a special appropriation of one hundred dollars for prizes for Palms, etc., at the meeting of the American Carnation Society, in the Hall of this Society, February 21 and 22, 1895, ...	100
Total for Prizes and Gratuities, . .	$8,050

The President, as Chairman of the Executive Committee, reported from that Committee a recommendation that the Society make the following appropriations:

For the Committee of Arrangements, this sum to cover all extraordinary expenses of said Committee, .	$400
For the Library Committee, for the purchase of magazines and newspapers, binding of books, and incidental expenses of said Committee, ...	400
For the same Committee, to continue the Card Catalogue of Plates, ...	100
For the Committee on Publication and Discussion, including the income of the John Lewis Russell Fund,	300
For the Committee on School Gardens and Children's Herbariums, this sum to cover all incidental expenses of said Committee, and to be paid through the usual channels, ...	250
For the salaries of the Treasurer and Superintendent of the Building, and the Secretary and Librarian, . .	3,000

These appropriations were unanimously voted.

The President also reported that the Executive Committee had appointed Charles E. Richardson to be Treasurer and Superintendent of the Building, and Robert Manning to be Secretary and Librarian for the year 1895.

The President further reported from the Executive Committee that they had voted to recommend to the Society the payment of $50 to William Castleton of East Boston, for his efficient services in extinguishing the recent fire in the Society's Hall. This appropriation was also voted by the Society.

The President reported in regard to the subject of a course of lectures by William Hamilton Gibson, referred to the Executive Committee at the last meeting of the Society, that they deemed it inexpedient to make any appropriation for that purpose.

On motion of William C. Strong, it was voted that the President appoint a Committee on School Gardens and Children's Herbariums for the year 1895. The President appointed as that Committee, the following named persons:

Mrs. Henrietta L. T. Wolcott, *Chairman.*

Henry L. Clapp,	William E. C. Rich,
George E. Davenport,	Miss Katharine W. Huston,
Mrs. P. D. Richards,	T. Otis Fuller.

J. D. W. French, Chairman of the Committee on Publication and Discussion, announced that the Schedule of Prizes for 1895 had been printed and a copy mailed to every member of the Society; and that the series of meetings for Discussion would commence on the next Saturday, with a paper entitled "A Day with our Birds," by Mrs. Kate Tryon, of Cambridge.

John G. Barker, Chairman of the Committee on Gardens, read the Annual Report of that Committee, which was accepted and referred to the Committee on Publication.

William C. Strong moved the following vote:

That a Committee of three members be appointed by the Chair, to consider the expediency of placing the property of the Society in the hands of a Board of Trustees, with authority to consult with legal counsel in reference thereto; and to report to the Society such recommendations as may appear desirable.

The motion was seconded by J. D. W. French, and carried in the affirmative. The Chair said that he would announce the Committee at the next meeting.

Mr. Strong moved that the Report of the Committee on the Revision of the Constitution and By-Laws, be taken up. This motion was carried, and the amendments proposed were, after two readings, approved by a majority vote, and ordered to be entered on the records, for consideration at the Stated Meeting on the first Saturday in April.

The Report was as follows:

The Committee to whom was referred the consideration of the Constitution and By-Laws of the Society, with special reference to Section VI, submit the following report:

A difference of opinion arose at the outset, as to the scope of the work to be done by the Committee. The prevailing opinion obtained, that we should review the entire code, and submit such suggestions as might seem desirable. Accordingly your Committee has held numerous sessions and given careful consideration to the various articles.

It does not appear to be necessary, or desirable, to make any radical changes in the present code. There are, however, some duties of the various officers, which it seems desirable to specify more distinctly. Some condensation and rearrangement of the articles, and a change of phraseology would also, in the opinion of your Committee, tend to more clearness.

In regard to Section VI, a decided difference of opinion still exists. A majority of your Committee recommend a change of phraseology of the second paragraph of the section, so as to make its meaning more clear.

The Board of Control of the State Agricultural Experiment Station having been merged with the Trustees of the Massachusetts Agricultural College, a change in Section II is necessitated thereby.

A copy of the various changes suggested by your Committee has been type-written, and is herewith submitted.

In connection with the consideration of the interests of our Society, and the largely increased valuation of its property, your Committee wish to suggest, and earnestly recommend, that its property be put in the care of a Board of Trustees, in order to its more secure and efficient management. To this end we recommend that legal counsel be employed to advise in regard to the mode of procedure.

William Nicholson, of Framingham, and
Leonard Thompson, of Woburn,

having been recommended by the Executive Committee for membership in the Society, were, on ballot, duly elected.

Adjourned to Saturday, February 2.

MEETING FOR LECTURE AND DISCUSSION.

Saturday, January 12, 1895.

A Meeting for Lecture and Discussion was held today at eleven o'clock, the President, Nathaniel T. Kidder, in the chair.

Following is a synopsis of the Lecture, prepared by the author for this report:

Days With Our Birds.

By Mrs. Kate Tryon, Cambridge.

When your Committee did me the honor to ask me to speak to you on my favorite subject, I at first felt it necessary that I should study long and well the food habits of my birds, that I

might not commit the mistake of recommending you to love any birds which, as horticulturists and agriculturists, you never could or never ought to love. Study I did,— with a result which can be summed up in two minutes. I thought it little worth while to repeat to you tales of the wonderful reproductive energy of noxious insects — you, who know but too well the sad facts of the case. I deemed it unnecessary to tell you at this late day — what you know very well — that birds were created by a wise Providence to keep this insect host in subjection. You know that the bird-haunted country is more fertile than the birdless country, and you know the punishment that has come to countries which, like France, have allowed their birds to suffer slaughter. You know that our own birds are not protected and encouraged as they should be. I feel certain that you, as students of Nature, are convinced of this. How, then, is it my duty to treat the subject of the hour? Certainly I should show myself unappreciative of my opportunity, did I not, above all, aim so to speak of your friends, the birds, as to stimulate new interest in them — so as to make you resolve that we must have more, not fewer, of them.

Fortunately or unfortunately for my subject this morning, I myself have had absolutely no experience as farmer or gardener, and shall not presume to decide whether or not the crow and the English sparrow must go. That problem is beyond me. I leave it for your Society, at some particularly lucid moment, to settle to your satisfaction. But if in that inspired discussion you should be anxious to find out which side of "the fence" I am on, perhaps I should exclaim with Thoreau: "Bless the Lord, O my soul! bless Him for wildness; bless Him for crows that won't alight within gunshot!" Apropos of the English sparrow question, I might suggest that the Almighty created him — though not in America; this, in all seriousness, for I cannot now consider the English sparrow a joking matter. "Do you think the English sparrow has driven our native birds away?" is the question a bird student meets everywhere. The questioner thinks affirmatively — that *all* our birds have been driven away. The fact is, this person never sees or hears birds anyway, and would scarcely know whether they went or staid. Perhaps as he came along the suburban street this very morning (in May), he passed a rose-breasted grosbeak, an oriole, a yellow warbler, and a red-eyed

vireo. Ah, yes, we have about us, in unexpected places, a wealth of bird-life. If everybody knew this, and appreciated it, we might be still more blessed as the years go on, for then everybody would contrive to keep natural shelter and food for the birds, and the birds would pay their board and lodging with interest.

After these introductory remarks, by means of stereopticon pictures of New England scenery and birds, the audience enjoyed a series of spring and summer bird-hunting strolls. First along an April road, a flock of crow-blackbirds were found, creaking and chucking in the tops of tall oaks. This bird, said the lecturer, bears an unpleasant reputation among growers of corn and fruit, and yet he is distinctly an insectivorous bird, and eminent authorities who have dissected hundreds of them, at all times of the year, find only trifling evidence of vegetable diet. Their case is precisely that of the robin. They are so gregarious and so numerous, that no ill-doing on their part escapes observation. If any one is inclined to shoot either of these birds, he should not do so before looking over such unbiased reports as those found in B. H. Warren's "Birds of Pennsylvania."

The bluebird's warble came from over the fields, very plainly suggested by the speaker's imitation, and the old favorite, in glowing plumage, was seen sitting on a fence-post. Here is a bird of whose usefulness there is never a question. Will not everybody who lives where bluebirds could possibly come, put out a house or a box to catch their fancy when they arrive in March? To be sure, the English sparrows, if present in your neighborhood, may take possession; still, the bluebird is a plucky fellow and knows how to look out for number one, as the purple martin knows to his sorrow.

The familiar song sparrow was heard and seen, singing beside the meadow brook, and his relations of the finch family were also introduced — the chipping sparrow with his hair nest in the orchard; the vesper sparrow of the dry hillside; the white-throated sparrow with his clear "Old Sam Peabody, Peabody, Peabody," whistle, and the handsome crimson finch (American linnet), with his craving for the spring buds of certain trees. But what matter for this? Did anyone ever miss the small number of leaves or orchard fruit that these birds nip in the bud? And how short is the season in which they can commit this mischief. Of

course if he takes a fancy to your blossoming trees, you may as well drive him off, for he has hundreds of useless wild or half-wild trees to go to.

The red-winged blackbird of the bushy swamp and overflowed meadow, is everywhere characteristic. His "tchuck!" and "gurglee!" are familiar to everybody. Redwings, with the robin and crow blackbird, repair to the ploughed land as soon as they come and these birds rid the soil of an incalculable number of noxious insect-grubs before the sowing. The dissector brings no bad record against this bird, and the cultivator who shoots them is very short-sighted, as regards his own interests. Indeed, to sum up this matter, a bird should never be shot because he *sometimes* offends. If he makes himself a nuisance for a week, or even a fortnight, he is making himself useful (although it may not be, indeed, in your particular neighborhood,) for the rest of the year. So that to grudge a bird an ear of corn is ill-treating the unpaid little workman, who made the crop possible. You *can* keep birds away from your crops, but to battle with the insect host is beyond all human ingenuity.

The golden winged woodpecker's resounding reveille came ringing over the countryside from the still leafless woods. This large, gaily marked woodpecker is known to every man or boy who has ever carried a gun. Alas, that this should be so! for here we have a truly famous eater of grubs and insects, gleaned from the soil as well as from the bark of trees. Farmers are often their own enemies, and never more certainly so than when they shoot for sport as they do, law or no law, "one er them air yaller hahmers," as they call them down in Maine. It is true, I suppose, that one woodpecker, the yellow-bellied sapsucker, decorates trees with those admirably even rows of holes, not for insects within the bark, but for the sap, the life-blood of the tree. But he doesn't spend all his time doing this, and he is now, in most localities, rare enough to cause regret to the bird-lover, and satisfaction to the forester.

The robin was the last of the spring birds treated. He is certainly fond of such dainty fruits as strawberries and cherries; but he has helped protect them from worse enemies. To shoot all the robins would be a dangerous experiment. From the economic point of view alone, no bird would be more missed.

The summer birds were seen in a June day's stroll through fields and groves near Boston. Each was interestingly characterized, often by original stories and imitations of notes and songs. Most prominent among these were the golden robin, kingbird, bobolink, rose-breasted grosbeak, red-eyed vireo, thrasher, scarlet tanager, indigo bird, chewink, cuckoo, the thrushes of the wood, blue jay, cedar bird, goldfinch, and some of the warblers, such as the redstart, yellow warbler, and Maryland yellowthroat. The haunt of each was shown on the screen, the bird itself in its natural colors and attitude.

The rose-breasted grosbeak, a bird now quite common in most Massachusetts towns, is known in Pennsylvania as the "Potato-bug bird," it being the only bird known to eat this pestiferous beetle.

In the above list of our common summer birds there are only two or three but are known as beneficial to the cultivator. Not far from the head of the list, for value, should be placed the red-eyed vireo and his numerous tribe, birds nearly allied to the fly-catchers proper. There are several species of these slim, little olive birds, and although they are little known, save to the bird-student, they doubtless far outnumber the robins. They prefer hard wood growth, chiefly maple, elm, and oak, and are common alike to forest, and suburban street.

As soon as one begins to make a study of bird-life, (which is of the utmost importance to one who tries to cultivate anything) the study of trees and shrubs obtrudes itself also. So attached is each species to a particular tree, or kind of copse, that the farmer or fruit grower might in time have a hand in choosing his bird-visitors or tenants by cultivating conditions liked by his favorite birds, and by omitting to cultivate conditions that might attract those which he considers his enemies.

Again the season is at hand in which we are to make the earth produce goodly fruits and pleasant flowers for our use and cheer. Let us add a new preparation this time — a new knowledge and appreciation of our feathered friends, without whom — did you ever think of it? — the earth could bear not even a blade of grass.

MEETING FOR LECTURE AND DISCUSSION.

SATURDAY, January 19, 1895.

A Meeting for Lecture and Discussion was holden at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair.

The following paper was read by the author:

FLOWER POTS AND THEIR MANUFACTURE.

By A. H. HEWS, North Cambridge.

When your Committee recently invited me to give you a talk on "Flower Pots and their Manufacture," I was at first strongly tempted to decline, feeling myself to be but poorly gifted in that direction. But as the invitation went further and allowed me the alternative of reading a paper, it seemed hardly courteous or possible to refuse.

Some of you may be aware of the existence of a Centenary club in Philadelphia, to which I have the honor of belonging; but as it may be new to others, I take the liberty of mentioning it. My membership is due to the fact that, sometime previous to the year 1765, my great grandfather commenced manufacturing pottery in the town of Weston; and through three successive generations (my own being the fourth) the business has continued in the direct family line without a break. This makes our firm eligible to the Centenary club, which consists of firms that have had an uninterrupted ancestral record of one hundred years or more in the same business. Having alluded to the existence of this club, may I be permitted to mention an item or two in connection with it, which may be of interest to you.

Up to the present time we have found but thirty-one firms in the United States that can claim membership. The leading one among them is the Francis Perot's Sons Malting Company, established in 1687 — 208 years of unbroken business record. The account given us at our first annual dinner by a member of this firm, of the early days of the business and its varying fortunes — also of the interesting process of malt making — was in itself well worth the trip to Philadelphia. Another remarkable fact concerning this club is that of the thirty-one firms which compose it twenty-one are in the state of Pennsylvania.

No one knows better than myself that pages of dates and figures make very dry reading, and I will endeavor not to weary you with them. Yet if I could, at this time, tell you the year when our firm began to make flower pots, to whom they were sold, and at what prices, it might interest us all. Unfortunately there is a long break in our records.

Our oldest account book which I bring with me today as evidence, shows that the first entry reads as follows: "Weston, April 19, 1775, Lemuel Jones, to Ware, debtor: 0£ 2s 8d;" and on the same day, another: "Isaac Flagg, to Ware, Dr., 0£ 2s 7d." The next charges were made on the 29th of that month, and there were three of them. In May of the same year there were eight more. No further sales were recorded until February 20; whether of 1776 or the year following, the book fails to tell.

From this time to 1788 the record is again broken. But from 1788 to 1810, a period of twenty-two years, we have a continuous account. The charges during that entire term cover about as many pages as we now often use in one day; and the amount in dollars and cents does not compare with single sales of the year 1894.

I have taken time to reckon up the sales of three years. The charges were made, for the most part, in English money,—pounds, shillings, and pence. But I find that in June of 1801 the form of entry was changed temporarily to the then new American method of computing values in dollars and cents. This evidently perplexed the accountant, who after two entries went back to the familiar English money. In June of the next year they made a second attempt to keep the books by the American system of reckoning, and were again, it would seem, speedily discouraged.

It is a somewhat interesting and remarkable fact that a third attempt was made in June of 1803. The books became American once more, but even then for a short time only. After this third experiment, they became apparently disgusted with the simple scale of tens by which America had decided to regulate her monetary system. Doubtless they returned gladly to the more involved and complex calculations which familiarity had endeared to them. But at last in 1807, again in June, the fourth attempt was made — this time successfully. After that there was no return to the old English currency.

Through all these years the term "flower pots" does not once appear. Again the record is broken; and I very much regret that the books containing the first sale of flower pots and the name of the purchaser cannot be found.

Those of you who can remember the year 1861, will recall the depressed condition of business after war was actually declared, and the discouragements that seemed to hang over nearly all branches of industry and trade. The members of the Hews firm looked on the dark side and felt sure that there would be no demand for flower pots, they being more of a luxury than a necessity, and that the factory must close. At that time I succeeded in getting permission to make my first venture as salesman "on the road." Going first to C. M. Hovey, I secured from him what was a good order for those times, some 10,000 pots or more for the spring trade of 1862. Several other good orders were booked that day, and it is needless to say I went home happy.

Not once after that, during the four years that the old firm continued to exist, were they able during the busy seasons of spring and fall to fill all their orders for flower pots. Not that these orders were remarkably large or numerous, but they were beyond the capacity of the firm.

My own records date back to October, 1866. The title of the firm at that time was Horatio Hews & Son. The first sale recorded was to Joseph Holmes, Grocer, of Cambridgeport; the second to Hovey & Co., of Cambridge; the third to Frank Becker. The prices were from 33 1–3 to 50 per cent higher than those of today, which is more than I should be willing to admit of the relative excellence of the goods.

We first got fairly under way with machinery for making small flower pots in 1869. I well remember that my father, always disposed to be a little cautious, thought that we should overstock the country and ruin the prices. We did in that year what we thought was a wonderful business in flower pots. We exceeded it by 33 1–3 per cent in the month of October, 1894.

It would be interesting to describe the great craze of the American people in 1875 and 1876 for reproductions of art-pottery — how we looked through every museum this side of Washington for copies of the pre-historic shapes — and to give an account of our success in reproducing from the grand collection of Gen. Cesnola, and from his discoveries in ancient tombs at

Idalium, Cyprus, of forms which were supposed to be of Phœnician manufacture, and to have extended back over a period of 1,500 years before Christ. It would also be interesting to describe the quaint shapes from Dr. Schliemann's collection, taken by himself personally in his excavations on the supposed site of ancient Troy. Through the kindness of the late Professor Horsford, we received the first photographs of those which were sent to America, and had the shapes reproduced here before the originals had reached the museum.

In telling you about the manufacture of flower pots, I must confine myself to personal knowledge of the subject, for one might look through the libraries of the country and the encyclopedias of the world and find himself not a whit wiser about flower pot manufacture at the close of his investigations than at the beginning.

As I have never visited any such factories in European countries, my information concerning them has been derived mainly from workmen who have come from foreign potteries. They have uniformly felt and assured me that America is always in the lead in regard to all improved machinery.

Until about 1864 or 1865 common flower pots throughout the world had always been made by hand on the potter's wheel. There had been, indeed, many different forms of this wheel, but it had always been propelled by the movement of either hand or foot, and this meant of course constant actual labor, more or less wearisome. When in the early fifties a wheel was made to be propelled by the foot, with two sizes of pulleys and a balance wheel, whereby the speed of the wheel was increased in the proportion of three to one, it was thought that perfection had been reached.

Much time, though probably very little money, had been spent previously to this date in attempts to make a pot machine; and it was left to Mr. William Linton of Baltimore, an experienced practical potter, to perfect and patent the first machine.

From him we purchased two machines and the exclusive right to use them in this State; and within a short time we were able to make great improvements upon his patent; so that I feel perfectly safe in stating that, from time immemorial until down to about the year 1863, flower pots had always been made in one and the same way — by hand, on a potter's wheel.

Some of you may ask how many could be made in a day. When some of the boys in the old pottery "broke the record" by making one thousand three-inch pots in ten hours, I am sure it created as much excitement among the other workmen as a Harvard-Yale boating bulletin suspended in a store window seems now-a-days to arouse in the minds of Cambridge students.

Then came the machine, which, however, made only small pots, up to about five inches in size: and while it had previously taken an experienced man to make his thousand three-inch pots per day, a smart boy without any previous experience whatever, could, in the same number of hours make three thousand on the machine. This was back in the sixties. If I told you how many we make now per day, you might question my veracity.

As I have previously said, these machines do not successfully make pots larger than the five or six inch size, and when the standard pot was adopted a few years ago, the hand process was practically abandoned in the principal potteries of the country, and the use of what is technically termed a jigger succeeded it. This is a revolving disk propelled by machinery. These disks, or jigger-heads, are made of different sizes and fitted with various rings.

Plaster moulds are made in very large numbers for each size of pots, and the larger standard (from six to twelve inch) pots are all made at the present time in these moulds. With us, pots from twelve to twenty-four inches are made as of yore by hand on the wheel. The making of the pot is not, it should be explained, its only cost; previously to that comes the preparation of the clay. The hundred years from 1765 to 1865, saw no improvement in the process of preparing it for use. It was ground in a wooden tank or tub, the motive power being furnished by an ox. There is even a tradition to the effect that sometimes when the ox was busy a cow was substituted in his place. Personally I cannot vouch for such a statement; but the old horse in the mill I shall never forget. When I had reached the mature age of six years I was considered old enough to go to the factory, before and after school, and drive that horse to grind clay. As I loved my books no better than the average urchin of the same age does today, that was probably the only "grinding" I did.

The various other processes remained as crude in 1865 as they had been a century previous — the drying, firing, and all connected with the manufacture.

The capacity of our flower pot drying rooms of today far exceeds the entire product of any one year prior to 1865. At that time the custom of using wood for drying and firing pots still continued. It required three cords of white pine and from thirty to forty hours' labor thoroughly to fire a small furnace. Today three tons of bituminous coal will fire five times as much pottery in fifteen hours.

It is a very common saying that one flower pot is as good as another, provided it will hold together long enough to grow the plant; which is equivalent to saying that one rose is as good as another; and when they say that one pot is worth no more than another they might as well say that a hybrid should be sold at the price of a tea rose. It has always been our practice to make, at a fair manufacturing profit, the best flower pot that could be produced. The late C. M. Hovey has often said to me, "Mr. Hews, I want all perfect pots." Then he would go on to explain why he wanted all perfect pots. "You see, Mr. Hews," he would say, "I am potting a nice plant which will be worth two or three dollars and I want a nice straight pot for it, but I am obliged to pull the pile over before I can find one. Then when I have found it, it is sure to be of such a soft burn that it will hardly hold together." Then he would take me into the greenhouse and hunt for a nice plant and at the same time be very sure to select one that happened to be in a warped, cracked pot. "And now you see, Mr. Hews," he would say, "that pot just spoils the sale of the plant unless I re-pot it." That was before the day of standard pots, and I am sure no man would have appreciated the standard size more than he.

When the Society of American Florists met at Washington in 1892, I spent several hours in the greenhouses of the various departments, in company with a prominent member of the Horticultural Society, who had never happened to visit the city before. To a certain extent I had prepared him for the kind of flower pots he would find there. I think he would say, if he cared to discuss the subject, that I had not underestimated them. To say that many of them looked as though they belonged to that class of pottery found in the Indian Mounds of Mexico, would be a reflection on the aborigines.

The poor preparation of poor materials is largely the cause of the thousands of inferior flower pots that flood our markets.

Grades of clay used in the manufacture of flower pots are almost as numerous as the banks in which they are found, and require many different methods of treatment; and to proper treatment is largely due the excellence of the ware. Our bank in Cambridge contains a very superior quality of clay for flower pots. Unfortunately for us, it also contains very many small stones which must be disposed of in some way before using.

To separate the clay from the stone has always been a very perplexing as well as expensive operation, and we have spent many thousands of dollars to accomplish this end, and are still experimenting. Three years ago we erected at our clay bank an expensive factory for this express purpose, putting in machinery capable of handling six hundred tons daily, which produced one hundred tons of sifted clay. A short description of this process may be interesting to you.

The clay is first ploughed by means of a horse and capstan, whereby one horse will do the work of twenty men with picks. This clay is then loaded in dump carts and carried to the mill, where it is shovelled through a disintegrator which expels the larger stones and crushes the smaller ones. It then falls on an endless belt and is carried to a revolving dryer. This is a new western patent, wherein by the use of crude petroleum for heat, we evaporate from twenty to twenty-five per cent of moisture from the clay, and while it passes through a direct blaze of white heat there is sufficient moisture all the time to prevent it from burning, which at this stage would make it worthless. To demonstrate this point beyond question, paper and dry shavings were passed through with the clay, and they came out without even scorching.

From the dryer it goes into large bins, where it must remain twenty-four hours, so that portions of it which have become too dry and hard may absorb the moisture from that not dry enough. From these bins it is carried to whippers, which beat the clay without further crushing the stone. From the whipper it goes to the revolving screens, and thence to the elevators.

The next process is mixing, or, as we term it, pugging, the clay, which is all done by machinery. From one machine it comes out very soft and plastic, to be worked in plaster moulds; from the other cut into hard cubes for the iron moulds of the machine.

The pot machine and jigger of today does each the work of from six to eight men at the wheel, even at as late a date as 1885.

The difference in cost between a good and a poor pot is very slight, and if the florist will demand and accept nothing but a first class pot, a standard in quality as well as in size will soon be reached. Some may ask what constitutes a standard in quality, and I would thus define it. To be standard in quality a pot must be made of clay properly prepared, be of uniform firing and of a smooth surface inside as well as out. It must also be of right porosity, which can be accomplished by the proper mixture of clay, and on a machine-made pot must have a smooth rim on the inside, so that the man standing at his bench, potting thousands of plants per day as is being done constantly in large establishments, may have some flesh on his thumbs at night and more time for recreation than he otherwise would have, if he felt obliged to ask forgiveness for his forcible denunciation of the rough edged pots furnished by many manufacturers. It must also be one that will stand transportation and years of usage if necessary.

The practical florists, and there are a good many of them, were long ago convinced that the best pots are the cheapest.

Before asking forgiveness for having trespassed so long on your patience I want to say a few words about ornamental flower pots, now commonly called "jardinieres." For some years there has been a constantly increasing demand for ornamental coverings for flower pots, and we have depended very largely for these upon articles of foreign manufacture. During the past year we have paid special attention to this branch of the trade, and have produced shapes and designs second to none, have imitated glazes so perfectly that it takes an expert to detect the difference between the real and the imitation, and withal have produced these jardinieres at prices which place them within the reach of every one.

I often ask myself whether it is probable that the demand for flower pots in the next quarter of a century will increase in the same ratio as during the past quarter. And having the books at hand I simply took the total manufactures of 1869 and 1894, and found the increase as ten to one, or in round numbers 700,000 flower pots in the former year and 7,000,000 in the latter; and if the same factory can in 1920, twenty-five years later, produce and sell 70,000,000 we shall verily be living in a land of flowers.

Discussion.

Samuel H. Warren asked whether the painting of flower pots was injurious to the pots, or to the plants grown in them.

Mr. Hews replied that if the plant was properly watered, no injury would result from the paint. He also remarked that one experienced plant-grower said "we shall not reach perfection in growing plants in pots, until we do away with porous pots, and thus avoid the growth of green mould upon the outside of the pots when in use." The Japanese always grow plants in glazed pots.

William C. Strong said that if we can have our pots burned so hard that green moss will not grow upon them, it will be an improvement of great value.

Mr. Hews remarked that F. L. Harris, of Wellesley, always wants the hardest pots, and added that his firm sent a schooner load of hard burned pots to Port-of-Spain, the capital of the island of Trinidad, to a firm who grow palms there.

MEETING FOR LECTURE AND DISCUSSION.

Saturday, January 26, 1895.

A Meeting for Lecture and Discussion was holden today at eleven o'clock, the President, Nathaniel T. Kidder, in the chair.

The following lecture was delivered on the John Lewis Russell Foundation.

Fungous Diseases of Ornamental Plants.

By Professor Byron D. Halsted, Botanist and Horticulturist at the New Jersey Agricultural Experiment Station, New Brunswick, N. J.

In the brief time that is before us it may be well to make a visit to some large grower of ornamental plants under glass, and pass from house to house upon a tour of inspection. This series of greenhouses will be ideal in the sense of offering examples of many of the leading kinds of fungous troubles.

Without further preliminary parley we will consider ourselves as having arrived upon the grounds of our florist friend, who gives us the freedom of his houses while we discuss the subjects that are to come before us.

Fungous Diseases of the Rose. First let us pass into the rose houses. No less than one hundred and sixty-five kinds of fungous diseases of the rose are recorded in the books, and therefore only a few of the most injurious can be mentioned here.

The Black Spot (*Actinonema rosæ* Fr.) Fig. 1, a, is perhaps the most wide-spread and troublesome of the fungous diseases of the rose. It was first described in 1826 and is so common as scarcely to need mention other than by name, to be brought to the mind of every rosarian. The foliage when attacked by the Actinonema fungus soon develops the characteristic dark circular spots, while elsewhere the leaves become pale and shortly fall to the ground. A house of roses badly affected with the Black Spot will show a lack of leaves, particularly upon the older parts of the plants, and of course the quantity and quality of the blooms are unsatisfactory.

The compound microscope reveals that the fungus consists of fine threads which feed upon the substance of the rose leaf. Starting at a given point from a spore that has been brought through the air or in water from a mature black spot, the fungus spreads in diverging lines until the circular area is the size of a dime or even a half dollar. After the growth has proceeded for a time small specks may be seen upon the surface of the spot. These are the spore-bearing places, after the skin of the leaf has been ruptured or thrown off, and multitudes of spores are produced. These spores, small as particles of dust, and as numerous as the sands of the sea-shore, are the "seeds" or the germs of the fungus and are capable, after finding their way to a healthy leaf, of inaugurating a new Black Spot.

As with many other fungous diseases of plants, some varieties of roses are much more susceptible to the Black Spot than others, and therefore it goes without further saying that, other matters remaining the same, it is an important precaution to grow those sorts that are the least subject to the malady.

As we glance around in the imaginary rose house, much of the foliage is observed to be more or less covered with a powdery substance (mildew), as if the fine dust from a flouring mill had settled upon the leaves, many of which are somewhat misshapen. This powdery substance consists largely of the spores of a fungus (*Sphærotheca pannosa* Wallr.) that bears the familiar name of Rose Powdery Mildew, Fig. 1, c. This fungus is a surface feeder and does not send its filaments deeply into and between the cells of the leaf. In its habit of growth, therefore, this fungus is quite in

contrast with that causing the Black Spot. Because superficial in its manner of feeding upon its host this mildew can spread rapidly over the rose leaves and quickly become manifest.

There is another rose mildew (*Peronospora sparsa* Berk.) which differs in many ways from the one last mentioned. It is deeply seated, in that its fine filaments penetrate through all portions of the leaf and afterwards produce upon the surface a fine growth that has suggested the common name of Downy Mildew for this fungous parasite. This mildew is closely related to the ones upon the grape, the onion, the greenhouse lettuce, and several other of the destructive downy mildews.

As we pass along through the rose house some plants are seen to be nearly defoliated. An inspection of the canes will show that they are covered with small pimples, each one of which abounds in spores. These microscopic spores ooze from the pimples or small rifts in the epidermis of the cane and germinate quickly and spread the trouble. This is the Rose Anthracnose (*Glœosporium rosæ* Hals.) and is not distantly related to several of the worst diseases of other cultivated plants. Thus *Glœosporium fructigemium* Berk., is a widespread fungous trouble, causing bitter or ripe rot in apples, grapes, and other fruits. The somewhat fatal anthracnose of the raspberry (*Glœosporium venetum* Speg.) is another near relative of the trouble in hand. The rose plant is most likely attacked through its young parts by the spores of the anthracnose falling upon the leaves or succulent canes and, if the latter, it may girdle the stem and thereby kill it. A plant thus infested by the anthracnose may send up new canes from near the base of the stem, which in turn are likely to bear pale sickly foliage and finally to be destroyed by the fungus that in this instance may spread to it directly from the old stem. This is one of the most contagious of the fungous diseases of the rose.

Some of the plants in the rose house have foliage that is badly marked with gray, irregular, often quite small spots. If these spots are looked at closely — and a hand lens will assist greatly — they are seen dotted over with minute black specks, the spore-bearing organs of *Sphærella rosigena* Ell., Fig. 1, b. In order that this trouble may have a common name and to avoid the word spot and any confusion with Black Spot the expression Rose Leaf Blight is proposed.

Before we leave the roses, and in answer to a question that has already been asked, I may say that the peculiar discoloration of

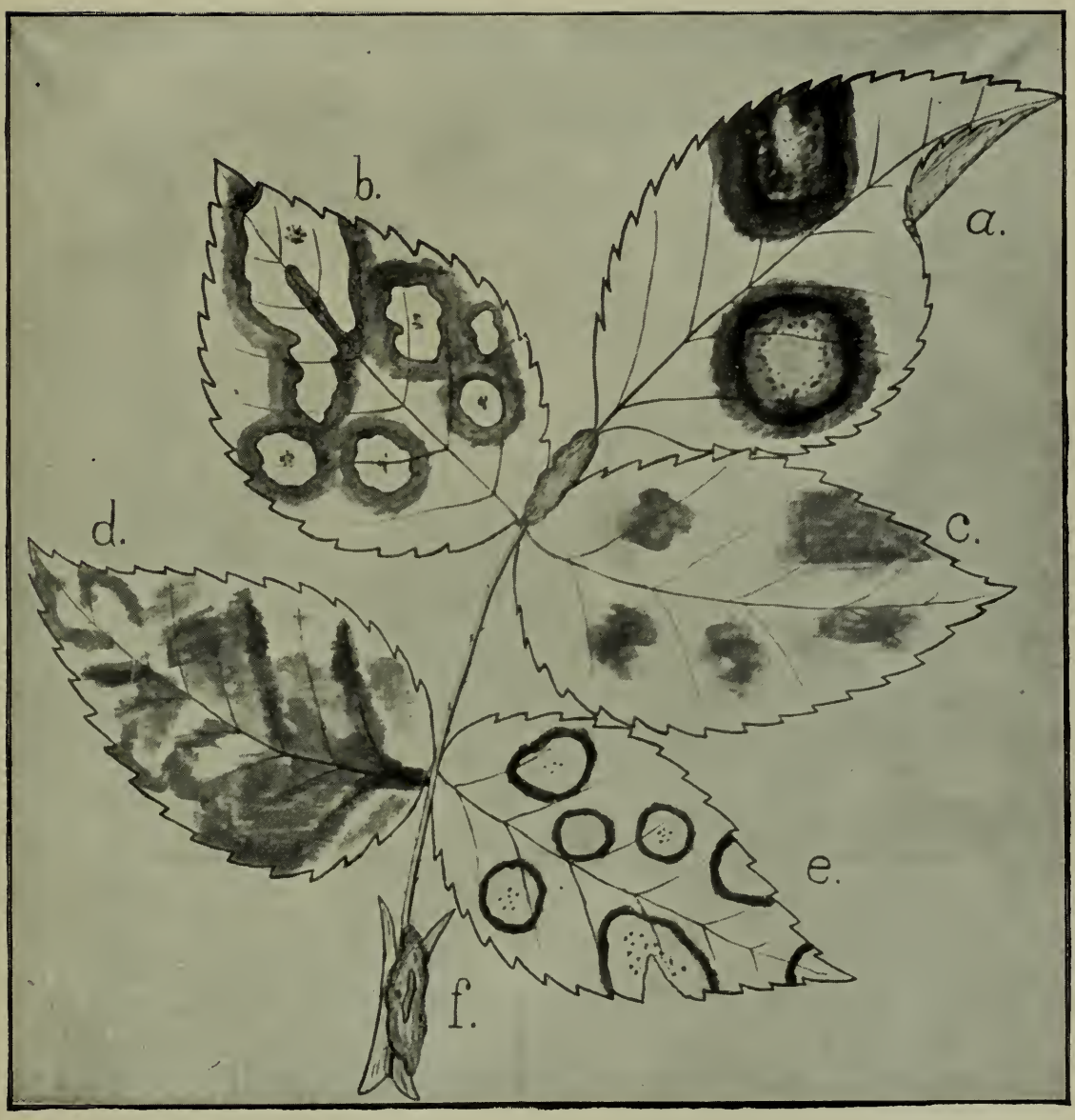

Fig. 1.

the leaves of La France, Fig. 1, d, which may for the lack of a better term be called "bronzing", is, so far as I know, not of fungous origin but probably due to a structural weakness permitting the skin to become scalded by too great sun exposure. We will now pass into the Carnation houses.

Fungous Diseases of the Carnation. The leading fungous enemy of the Carnations today is the Carnation Rust (*Uromyces Caryophyllinus* Schr.) This fungus, while quite new to this country, is an old pest in Europe, and doubtless came to us in imported stock, and within the past five years has spread throughout the country. The rust can be quickly distinguished by the plump gray blisters produced upon the leaves and stems. After the epidermis is broken the rusty brown spores escape in great numbers and the affected spots then resemble those produced by other rust fungi upon grains, grasses, and many other plants. Before the time of spore-formation the fungus has sent its slender threads in all directions through the leaf or stem, and the plant has become badly diseased.

The work of the Carnation Leaf Spot fungus (*Septoria Dianthi* Desm.) is easily recognized by the light brown patches upon the leaf and stem. While not confined to any portion of the plant, upon the stem it is most frequently found between joints. The lower half of the leaf usually has more spots than the upper half, and frequently a leaf bends abruptly downward near the middle when a large spot has weakened it at that point. Occasionally a leaf may have several bends downward and sidewise, due to as many diseased spots. Over the light brown (sometimes reddish) affected areas, there develop a number of minute black specks, which in an old spot can be readily seen with the naked eye. These specks consist of flask-shaped bodies, the walls of which are formed of the interwoven threads of the fungus, and upon the inside a vast number of long needle-shaped spores are produced. The spores, mingled with a viscid substance, ooze from the small opening through the wall of the flask and afterwards become disseminated in various ways. In some of the fungi previously mentioned, the spores have been described as produced without cover upon the surface of the plant, but in the Carnation Septoria the surface is finally reached by the discharge through an opening. When lying upon the surface they may be moved when dry by currents of air, as motes float in a sunbeam. On the other hand any stream of water never so small can carry them along.

In case of plants under glass where watering is frequent it is likely that the wet method of transportation is most active, especially if the hose is used with considerable force. A strong spray playing upon a healthy plant through one affected with the Leaf Spot would be quite sure to carry along an abundance of the spores and leave them in drops of water in a suitable condition for germination. The prevalence of the disease at the base of the clasping leaves of the carnation may be due to the fact that the water is held there longer than elsewhere.

The Carnation Anthracnose (species not fully determined) is a third fungous trouble frequently met with, and may be characterized by sharp-pointed black hairs arranged in microscopic rosettes upon the surface of stem or leaf. The spores are borne upon the tips of radiating threads intermingled with the black hairs. This fungus is fond of moisture and is most frequently found upon the lower stems and leaves that lie upon the earth or are matted together. A whole branch may be destroyed by the anthracnose that has affected its base and checked the flow of sap.

The Leaf Mould (*Heterosporium echinulatum* Berk.) is a fourth fungous trouble of the Carnation, which is easily distinguished by its forming circular spots in the foliage varying from a small dot to a ring extending across the whole leaf. At first the spot is of a pale ashy color covered with a dense mould, but changes with age to a dark brown. This change of color is due to the maturing, upon the minute branches of the mould, of many spores. When fully ripe the spores are covered with microscopic prickers. In its worst form a plant, and particularly the younger portion, will be literally covered with the blending circular spots of this fungus.

The last fungous disease of the Carnation to be mentioned before passing on to the violet houses is of bacterial origin. The germs of this disease are exceedingly small, there being no thread-like structure or spores as met with in the fungi previously mentioned. Attention is attracted to the victim by the manifest lack of vigor, and the consequent failure to produce the usual number of blooms. If a leaf of a diseased plant is held up to the light many somewhat transparent dots will be observed, varying from a mere point to specks an eighth of an inch in diameter. These dots are the starting points of the bacteria which, swarming in the cells of a leaf, destroy the ordinary green substance (chlorophyll), and finally the leaf becomes discolored and lifeless.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

The change of color in the affected leaf is controlled somewhat by the color of the bloom. In the yellow varieties the foliage often turns to some shade of lemon, while purple is not infrequent in the pink sorts. The bacterial germs most likely enter the leaf through the stomates and, multiplying, spread from there.

This bacterial disease sickens the whole plant, and there is no fungous growth that breaks through the epidermis as in the rust, etc. Many other plants are liable to similar affections, the most widely known being the twig or fire blight of the pear, apple, and quince trees.

Fungous Diseases of the Violet. Passing from the carnation to the violet houses, we observe that health does not prevail. Some plants are stunted, others are yellow, while others still have the foliage blotched and spotted in various ways. It will be best for us to single out certain leaves and note the fungi that prey upon them.

The Violet Leaf Spot (*Cercospora Violæ* Sacc.), Figs 2 and 3, as the common name suggests, causes the foliage to become more or less covered with circular spots. There are several fungi causing the spotting of violet leaves, but the Cercospora can usually be detected by the dark centre of the spot due to the multitude of spore-bearing threads that are brown colored. Black moulds of various kinds often flourish upon the dead tissue of the spot and greatly change its appearance.

Another spotting of the violet leaves is caused by another fungus, namely, *Phyllosticta Violæ* Desm., Figs. 4 and 5, of a quite different type from the one above mentioned. By the naked eye, when carefully inspected the Phyllosticta spots are seen to have no dark central area, but scattered over the whole brown spot are minute dark specks in which the spores are borne. The Cercospora spot has the spores on minute aërial branches, but in the Phyllosticta Spot the spores are formed within flask-like bodies, and ooze out of the open neck when mature. Similar to the Phyllostica are a number of other violet parasites, as *Marsonia Violæ* Sacc. Besides these there are some fungi which cause blotching of the leaf and a general collapse of the whole plant. For example, there is an anthracnose (Glœosporium) of the violet similar to the one mentioned upon the rose. There is a bacterial trouble also, so that the violets are fully supplied with fungous parasites.

Fungous Diseases of Dracænas. Some of the cultural varieties of Dracænas, notably the *Cordyline terminalis*, have failed to

preserve their health. The fungus *Phyllosticta maculicola* Hals., is recognized by producing small brown angular spots in the leaves, which finally show spore-bearing pimples.

There is a tip blight of *Draæcna fragrans* that often greatly disfigures the otherwise highly prized plants. "It is often the tips of leaves that are most subject to the bad effects of the blight, and this is true of many other than the Dracæna plants. This may be due to the fact that the water holds to the pendent tips longer than to any other portions. When the plants are sprinkled the upper portions of the foliage retaining only a film of the liquid quickly dry off, while the water descending to the tips remains there for a long time. The presence of this moisture upon the surface of the leaf-tips furnishes the proper conditions for the germination of spores that may have been brought there by the descending water as it flowed along, gathering to itself the spores previously deposited upon the surface of the leaf. It is thus seen that there are at least two good reasons why the tips of drooping leaves may be infested with fungi while the upright parts escape. As a matter of fact, however, such portions do not wholly escape. Not infrequently in the case in hand, the Dracæna leaves may be blighted midway of tips and base. In such instances it is possible that at some time there has been some injury by means of which the spores found an easy place to germinate, and their germ tubes to penetrate the leaf.

There is a third reason why the tips are more susceptible, namely, the greater surface exposed in proportion to the amount of tissues, than in the other parts of the leaf. The entrance of disease germs is largely a surface action, and therefore the chances are greater as the tip of the leaf is approached. The tips being thinner and farther from the base of interior water-supplies, often suffer from wilting, and become dried naturally. Anything of this nature assists the parasites to get a foothold. The wonder is that more tips are not attacked. When once a fungus has established itself, it will begin to work its way in the leaf toward its base. This advance may be quite uniform and rapid, so much so that there is a distinct line between the living and the destroyed tissue."*

Fungous Diseases of Palms. The growers of palms are far from exempt from troubles of a fungous nature. It is difficult to

*From the writer's Report from the New Jersey Experiment Station for 1893.

name the palms that are most affected, many of them becoming blotched more or less with one or another fungus. A tip blight is not uncommon. I have studied the Kentias more than any other palms and will speak particularly of them. If the dying of palm leaves was confined to the tip it might be concluded that the decay was due to the extreme susceptibility of the delicate end of the leaf to untoward influences, but it is not unusual to find circular spots in the body of the leaf that have the same associating fungus. The tips blight more frequently, possibly, because they are pendent and water collects and is retained there, giving the spores favorable conditions for germination. The fungus found in these blighted tips and elsewhere in the leaves is an anthracnose (*Colectotrichum Kentiæ* Hals.). It is a deep feeding parasite and causes the ruin of the plants or so disfigures them as to forbid their going to market.

Fungous Enemies in the Orchid House. The royal and fantastic family of orchids is not free from fungous enemies. The Sobralias, for example, are killed outright by an anthracnose (*Glœosporium cinctum* B. and C.) that works in the foliage. In like manner the large and tender leaves of the Bletias are preyed upon by several blights that greatly disfigure the plants. In many instances the pseudo-bulbs have large pits of decay due to one or more fungi. Occasionally the large and otherwise superb flowers of various orchids are spotted and blotched with brown which in some instances is due to micro-organisms. It is to be remembered that the tissue of the floral part is exceedingly delicate in structure, and also the colors are such that any disease is remarkably conspicuous. Sometimes the spotting consists of minute specks, in great numbers, scattered over the whole surface of the petal, and so uniform is this that one might almost conclude at first sight that it was characteristic of that particular species of flower. It is often true that the little specks will be bordered by a delicate ring of pink which will heighten the peculiar appearance of the blighted portion. There may be on the other hand only a single blighted patch, and this, by rapid increase, spreads throughout the whole orchid flower. When a petal is thus attacked it soon becomes worthless and falls down, either remaining attached by its base or drops away entirely. Such patches, upon examination with the compound microscope, reveal the presence of a fungous growth which is well known to the gardener as the gray mould. This gray mould (*Botrytis vulgaris*) is the most common to be met with

upon old blooms in greenhouses or other warm, moist places, and, abounding in spores which are borne upon the tips of slender threads, it keeps the atmosphere well stocked with germs, and these falling upon the delicate tissue of the orchid bloom will induce decay.

As a precautionary measure it goes without further saying that any and all old and worthless parts of greenhouse plants that are harboring this gray mould, or in fact any fungous growth, should be promptly removed from the place and consigned to the furnace. In this way a large portion of the decay of petals and other floral parts will be obviated.

Botrytis is able to gain a foothold within the vigorous leaves, particularly when some petal or other floral organ already infested with the gray mould falls upon the leaf and remains there. The fungus therein spreads from the petal to the leaf and shortly a blotch is formed upon the leaf, which continues to spread for some time, and possibly the decaying leaf in falling upon another will continue to spread the disease.

Fungous Diseases of Variegated Plants. Many of the indoor foliage plants are subject to blights of various sorts, but limited time will permit only a word under this head. It may be stated as a general principle that variegated foliage is more subject to attacks from fungi than the ordinary green leaves of plants of the same species. Thus the *Ficus elastica* var. *variegata*, while it may possess added attractions on account of the lack of chlorophyll, for the same reason is more susceptible to blights than the ordinary plants. Variegated Pelargoniums are apt to suffer from fungous attacks while the green leaved sorts go free. In like manner the day lilies, like the *Funkia undulata* var. *variegata*, are often worthless, and in such plants as the Aspidistras, where large white stripes run through the leaves, the fungi are much more apt to attack the etiolated parts. In short, gardeners are getting shy of variegated plants, because such have an evident tendency to blight.

Fungi of the Seed Bed. Passing now to the nursery department of the plant establishment, we find the seed bed is not exempt from fungous enemies. The leading trouble passes under the common name of "damping off," which is a general expression for a failure of the seedlings to maintain a stand. There may be many reasons for a failure at this point, but the chief one is the presence, in the tender tissue of the young sprouts, of microscopic

fungi of the genus Pythium, the *P. De Baryianum* Hesse., being the most common one. This fungus often attacks the plants with so much vigor as to sweep them off in a short time. In structure the Pythiums are quite similar to the mildews of the deeply seated type and are perhaps still more nearly related to the fungus causing a fatal rot of the round potato, the celebrated *Phytophthora infestans* De By.

Several other fungi may attack seedlings; in fact they are subject to the whole list of parasitic enemies that the host is subject to in its later life. The whole matter of seedlings and their relation to fungi is a theme in itself sufficient for the hour. Often the seed contains the fungus within itself, and as it germinates the parasite starts into activity, and ruins its subject. Again the germs are in the soil and pass from thence to the victim. It is not unusual for a fungus to spread from a central point in all directions through a seed bed, killing all plants as it goes.

Fungi of the Cutting Bench. Much of what has been said concerning the seed bed holds true of the cutting bench. Slips are portions of plants which are placed with one end in the moist sand, and have nearly the same conditions surrounding them as seedlings. They are subject to the attacks of "damping off" fungi coming from the soil, and in addition to this carry with them from the parent plant many hidden seeds of decay which under the new conditions may develop and ruin the slips. In the cutting bench therefore many fungi show themselves which are often only obscurely seen in the stock plants. Thus rose cuttings fail, because the stock has the Black Spot or the Anthracnose, the carnations damp off from the rampant growth of the Dark Stem-blight, and violets fail from the Leaf-spot fungus taking possession of the cuttings. Pelargoniums are stricken down with a blackening bacterial blight, and hosts of other sorts of cuttings fall under the influence of moulds of various sorts.

Remedies for Fungous Diseases. This paper upon Fungous Diseases would be incomplete from the standpoint of the floriculturist, without some words upon the subject of remedies. It is here that information is needed by everyone, and no one appreciates the lack more than those who desire to instruct. Naturally enough the diagnoses of the diseases have gone ahead of the remedial measures. It is the hope that in the near future more time will be given to the actual treatment of fungous troubles. Hospitals are

needed where sick plants may be cured, and thereby ways and means devised for the benefit of practical growers, who in turn will nurse their own ailing plants, or, better still, be able to foresee the enemy and avoid him. If one may be pardoned the expression, the best way to cure a plant is to preserve it in health.

The conditions which are provided for the best growth of greenhouse plants are those that favor the development of the fungous enemies. As a rule they thrive best with plenty of heat and moisture, therefore a greenhouse, other things remaining equal, will be the place where blights of all sorts may be expected. It is well known that the means of propagation is through the transfer of the fungus itself or its spores produced in countless numbers. The preventive measures are, first, to start new plants with healthy stock either from seed, or slips free from the disease; second, to prevent the germs of decay from entering the healthy plants, and third, if they are present to check their growth as much as possible.

Strong healthy seed is a very important starting point, the necessity of which is not always fully realized, but this is not the time to dwell upon this fact. In like manner cuttings should be from the best possible stock. If the seed and the slips were healthy, the only point necessary for continued vigor would consist in keeping out the germs, and surrounding the plants with the best conditions for growth. The latter the propagator is supposed to do. The germs enter from the soil or the air or both. Care should be exercised that the seed bed be germ free, and to this end the wood work of greenhouses needs to be fumigated and cleaned as frequently as possible. The soil is a ready receptacle for receiving spores and soon gets charged with them, therefore a frequent change of soil is important.

After everything has been done along sanitary lines for the good health of the plants, namely the use of healthy seed in healthful surroundings, there are some matters that still may need attention. Fungicides have their place in the greenhouse as well as in the orchard and garden. There are a few germ destroyers that when properly used have paid handsomely.

With roses, the mildew may be controlled by sulphur, either dusted on the foliage or heated upon the greenhouse pipes. The Black Spot has been materially checked by the Bordeaux Mixture and Cupram (Ammoniacal Solution of the Carbonate of Copper). In the Bordeaux Mixture, freshly slaked stone lime is combined with

sulphate of copper (blue stone) and applied as a thin wash with a spraying pump. The formula is five pounds each of the lime and sulphate of copper, to fifty gallons of water. The milk of lime may be made up and kept in stock to which the sulphate of copper, also kept in solution, may be added as desired for spraying.

The chief objection to the use of Bordeaux Mixture in the greenhouse is the bluish lime coating it gives to the plants. On this account Cupram is better. The formula for this latter is five ounces of carbonate of copper dissolved in three quarts of strong (4 F) ammonia, to be afterward added to fifty gallons of water. A convenient way to keep this compound is in the concentrated solution in a well corked bottle. Thus a bottle holding the three quarts of ammonia can receive the five ounces of copper and stand ready for use, it being necessary only to pour out an ounce for each gallon of water used for spraying.

These two fungicides are the chief ones that can be recommended for fungous troubles of the greenhouse. A solution of Potassic Sulphide, a half ounce to a gallon of water, has proved particularly beneficial with carnation diseases. This sulphide readily dissolves in water and is easily prepared and kept for use.

Good results have followed the use of the Bordeaux mixture for violet troubles, and many other plants grown under glass would doubtless be equally benefited by its use.

The work against injurious fungi must be preventive instead of curative, and the old saying that "an ounce of prevention is worth a pound of cure" is nowhere more applicable. It is often true that the enemy gets so far along with its destructive work that it is the part of wisdom to destroy the plants instead of trying to save them, much less propagate from them. Fungicides are most useful at the time of attack of the fungus and, therefore, often need to be used before the parasite shows itself. It is most likely that greenhouse plants generally would profit by a spraying now and then, and a more general use of fungicides is to be looked for by growers of ornamental plants.

The man who keeps his plants in the best way, observing the proper conditions of seed bed, soil, air, and food supply, the one who has all things neat and clean, will also be the one who sprays. He will not delay until the plants are sick through and through, but will use the fungicide as a shield for plants while healthy. Such an one will have the greatest pleasure in his plants and be most largely rewarded by them for his watchful care.

Discussion.

W. D. Philbrick asked whether Professor Halsted had ever used extremely diluted Sulphate of Copper,—one ounce of the sulphate to one hundred gallons of water?

Professor Halsted answered that he had no doubt that the proportions named would be useful in many cases. He said that fungicides were frequently used too strong, as experimenters found to their cost. He had an acre of plants on which to experiment. In his trials upon beans he used Bordeaux Mixture of three degrees of strength. The full strength kept off the fungi, and the leaves retained a good color, but the plants were stunted in growth, attaining no more than half the usual size of the variety. With the strength reduced one-half, the good effects were quite as evident, but the dwarfing was still considerable. Reduced to one-quarter of standard strength, the mixture thoroughly protected the plants from fungous injury, but still prevented full development. This trial showed conclusively that fungicides are generally used too strong; next year still weaker solutions will be tried. Fungous spores will not germinate in water in which even a small quantity of copper filings have been kept, and this without any sulphuric acid, or any other corroding agent, than the supposed pure water contained. The greatest success with fungicides is secured when they are put in the right place at the right time.

Charles J. Dawson inquired what should be done to prevent "damping off" in the seed pan.

Professor Halsted replied that while the question is an important one, the attention of the station officers had not been so specially called to it as to many others, and therefore but little is as yet known about it. He did not see why the soil should not be sprayed as well as plants; nor why hot water could not be used — not so hot as to endanger the plants, but sufficiently so to kill the fungous threads, which cannot endure a very warm bath. He knew that young ferns had been so treated successfully. He suggested that possibly Bordeaux Mixture, if sufficiently reduced in strength, might prove more advantageous.

Jackson Dawson said he had tried some chemicals but was more successful with quite hot sand. Still, he thought seedlings could be saved quite as well by washing out the soil in which they were started, and pricking them out in purified soil.

Kenneth Finlayson desired to learn how it was that rusts attained such headway before their presence was detected.

Professor Halsted said in reply that the rusts develop within the plants they attack, and usually go all through before producing any spores. The spores are then produced upon the surface, but the host plant is already ruined. However, spraying the whole body of plants, as soon as the rust appears, may prevent the spread of the disease through the crop, by destroying the spores before they are distributed from the first diseased plant. Many fungous diseases are somewhat local and can be readily removed, but rusts are deep-seated. Spraying at short intervals is the best preventive of the spread of most fungous diseases.

Charles J. Dawson had noticed a kind of rot upon the stems of some plants, and asked if such blemishes were caused by fungi.

Professor Halsted in reply stated that bacterial diseases attacked the crowns of violets, and probably some species begin their destructive work upon the stems of other plants.

BUSINESS MEETING.

SATURDAY, February 2, 1895.

An adjourned meeting of the Society was holden at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair.

Charles E. Richardson read his annual report as Treasurer and Superintendent of the Building, which was accepted and referred to the Committee on Publication.

Henry L. Clapp, from the Committee on School Gardens and Children's Herbariums, read a supplementary report, giving an account of the Garden connected with the Robert G. Shaw School, by W. E. C. Rich, Principal. This report was accepted and referred to the Committee on Publication.

Edmund Hersey, Chairman of the Committee on Large, Old, or Otherwise Interesting Trees in New England, read a report from that Committee, and also presented a bound volume of photographs and descriptions of such trees, prepared by the Committee. On motion of William C. Strong the report and the book were

accepted, and it was voted that the Committee remain in office, and be requested to continue their work on the subject.

The President appointed William P. Rich a member of the Committee on School Gardens and Children's Herbariums, in place of T. Otis Fuller, who had declined to serve.

The President also announced the Committee provided for at the last meeting of the Society, to consider the expediency of placing the property of the Society in the hands of a Board of Trustees, as follows: William C. Strong, William H. Spooner, and Walter Hunnewell.

The following named persons, having been recommended by the Executive Committee as members of the Society, were, on ballot, duly elected:

Dr. Daniel D. Lee, of Boston.
John C. Haskell, of Lynn.
Fred. W. Fletcher, of Auburndale.
Mrs. Clara E. Sears, of Boston.
Hon. Charles W. Hoitt, of Nashua, N. H.
Harry Burnett, of Southborough.

Adjourned to Saturday, March 2.

MEETING FOR LECTURE AND DISCUSSION.

The following paper was read by the author:

Hardy Plants and Shrubs and their Arrangement.

By J. Wilkinson Elliott, Landscape Architect, Pittsburg, Pa.

It must be remembered that my experience has been with a more western civilization, and some of my remarks may not have much force addressed to so enlightened a gardening community as that of Boston and its suburbs. Yet I am told there are some people in this neighborhood who persist, and at considerable outlay and trouble, in using thousands of tender bedding plants to make poor representations of inanimate objects. If this is true they cannot make the plea of not knowing better, for all about them are many of the best and most tasteful gardens in America — splendid examples of garden schemes in which the so-called bedding plants cut little or no figure.

There has been so much written and said on the subject, and the great advantages of gardening with hardy plants and shrubs are so apparent, as compared with tender bedding plants, that it seems a waste of time and words to make any argument in favor of one and against the other, but the argument is needed as much as ever, for it is an undeniable fact that nine-tenths of the ornamental gardening in America is still done with a few commonplace and uninteresting bedding plants. Think of the pity of it, that all this enormous annual expenditure should be wasted — an expenditure that leaves our gardens in the fall exactly as it found them in the spring, bare earth and nothing in it.

Is it because the people prefer bedding plants to hardy ones? You who know hardy plants know that this is not so. Who would prefer, let us say, a bed of coleuses or geraniums to a fine group of rhododendrons, or azaleas, or Auratum lilies, or Japanese anemones, or to the hundreds of fine things to be had in hardy shrubs and plants? Any one of these has a beauty incomparably greater than can be produced with the most lavish use of bedding plants. Then the bedding plants are a yearly expense, while an investment in hardy plants and shrubs returns the investor an annual dividend in increased size and loveliness. Every dollar spent for them secures a permanent addition to the garden, and the time soon comes when the annual outlay can be devoted entirely to care and culture.

I know a gentleman who carried a fine stalk of Auratum lily flowers into the office of one of the largest business houses in our city. Not a man in the office knew what it was, and all were unwilling to believe that it grew in his garden. They supposed it to be some rare and costly flower grown in a conservatory. Yet Auratum lilies and dozens of other things as fine can now be bought as cheaply as bedding plants.

The people do not prefer bedding plants to hardy ones. They have no choice in the matter. They buy what the local florist offers and what they see in their neighbors' gardens. They are not sufficiently interested to make inquiries. They do not read the gardening papers, and with few exceptions the managers of the city parks, who should be such educators of the people in gardening, are content with what might be called an annual pyrotechnical display of bedding plants as it is of such short duration and little artistic value.

The popularity of bedding plants is happily on the wane; it occurs to almost everybody after a time that they do not get much for their money when they buy this sort of material, but I cannot say that hardy plants are gaining much. There is no considerable effort made to attract the public attention to their merits, and when some man, more enterprising than his neighbors, does take the trouble to hunt them up and do his gardening with them the result is not always happy. He is very apt to use them as he would bedding plants — that is, in formal beds cut out of the grass of the lawn. Of course hardy plants do not lend themselves to this treatment, and it is one of their greatest merits that they do not. Better no flowers at all than that the lawn should be cut up in formal beds for their accommodation.

An objection often urged against hardy plants is their short duration of bloom, but this really is one of their greatest merits. Let us consider the garden that depends exclusively upon bedding plants for its decoration. It is usually the first of June before they can be planted, and it is well into July before they are effective, and often by the end of September they are killed by frost, and every day during their short season of three months they are as unchanging in appearance as the carpets in our houses and about as interesting.

On the contrary, the well planned and well planted garden of hardy plants begins its season with earliest spring and terminates it not with the first light frosts of fall but when November brings some real winter weather, and then only goes to rest to delight us afresh with the coming of another spring. Almost every day throughout its long season the hardy garden is changing with the changes of the season, something new is coming into bloom, and before it becomes monotonous its season is over and its place taken by some other flower equally beautiful and interesting but entirely different. Our garden is never tiresome, its past is a pleasant memory, its future a delightful anticipation, and its bloom an accurate calendar of the seasons. Is this true or only fanciful writing? It is true, every word of it — hard but pleasant facts.

Snowdrops are in bloom with the first pleasant weather in spring; last spring they were in bloom during the first week in March. They are quickly followed by scillas and crocuses, and then comes the season of tulips and narcissuses, with their count-

less varieties. What a variety of form in the narcissuses! What a wealth of colors in the tulips! Their season is fully a month, and before it is done the early flowering herbaceous plants are showing bloom, and the flowering shrubs have begun a display that will end only with fall. By May scores of hardy shrubs and plants are in bloom — creeping Phloxes, Columbines, Doronicums, Oriental Poppies, German and Siberian Irises, and in shrubs, Lilacs, early Spiræas, Japan Quinces, Magnolias, and Mollis and Ghent Azaleas, and we must not forget the hardy climbers, of which the Clematis, in its numerous splendid varieties, covers a season of fully six months and with which alone a most charming and interesting garden could be made. June brings such a wealth of bloom that we are at a loss as to what to use and what to reject. Rhododendrons in many varieties and colors, Kalmias, Candidum and Elegans Lilies, and hardy Roses are the flowers, perhaps, that hold the greatest share of our admiration at this season, and if June gave us hardy roses alone, our garden should be satisfactory. The memory of a fine collection of hardy roses in full bloom is worth more than all the ribbon and carpet beds ever devised, and and in saying this, it is with full knowledge of the much advertised rolls of carpet, vases, worlds of flowers, etc., with which South Park delights the citizens of Chicago.

I fear that much of the benefit of the example of Mr. Olmsted's and Mr. Codman's work at the World's Fair was lost. It was so well done and so naturally done that a majority of the visitors never suspected that a landscape gardener had been employed.

After the glorious beauty of June we might be content to have our garden tame for a month or two. But there is no need for tameness. At the beginning of July the magnificent Japanese Irises are in bloom, than which there is nothing finer. Wealthy men build and maintain glass houses at great expense to shelter things not half so fine. After the Irises come the Japanese Lilies, and with a little management these will give a brave show of bloom throughout the summer and fall until frost comes. To carry us through the summer we have also tall Phloxes, Yuccas, Rudbeckias, Gaillardias, Tiger Lilies, Hollyhocks — single and double — Campanulas, Rugosa Roses, Day Lilies, Althæas, Hydrangeas, Tamarix, hardy Sunflowers, and a host of other good things that the time at our disposal will not permit us to consider. That is one trouble with a paper on hardy plants and shrubs; a

list of the desirable varieties would make a long article and that without any comment.

And when fall comes we have still some of the best flowers in reserve, notably the Japanese Anemones and the old-fashioned and really hardy Chrysanthemums. The flowers of both these good things will endure the early frosts and early snowstorms and delight us with a show of bloom on such sunshiny days as we may be favored with in late fall.

It may be thought that to win my admiration a flower must be hardy. Nothing of the sort. Certainly the basis of all good outdoor gardening must be hardy material, but the skillful gardener or amateur will find a place for many tender plants, and especially for the so-called summer-blooming bulbs, such as Gladioluses, Dahlias, and Tuberous Begonias, all of which are easily wintered in any dwelling house, and he will even find a place for the new large flowering Cannas, but that place is not in isolated beds on the lawn. I have seen them used to the best advantage in small groups in the margin of a shrubbery where the full benefit of their really fine coloring was gotten, but their stiffness and ungracefulness concealed. And the many fine annuals which are so cheaply and easily raised from seeds are not to be overlooked—*Phlox Drummondii*, Sweet Peas, Asters, Calliopsis, are all fine, and I am free to confess that there are but few things among hardy plants that I admire more than a fine mass of tall Nasturtiums.

The most important thing we have to consider in connection with gardening hardy plants and shrubs is their arrangement. We must study to produce a pleasing effect at all seasons and to have a succession of bloom so that the garden will never be dull or uninteresting. First, let us take the smallest garden that we can hope to make a gardening success with, that is, a fifty foot city or suburban lot. This is a lot usually considered too small to do much with in a gardening way, yet it is the lot owned by thousands of well-to-do and cultivated people, and well worthy of consideration. I can best illustrate a good arrangement for such a lot by describing a garden in my neighborhood. The lot is fifty feet front and one hundred and twenty feet deep to an alley. A path leads from the sidewalk to the steps of the front porch; thence around the west side of the house to the steps of the kitchen porch, and thence straight out to the alley.

The house is thirty feet from the street line. The owner of the lot believes with me that every garden should be enclosed, and has selected as the most desirable enclosure a hedge of California privet, which furnishes him a background of verdure to set his flowering plants against. He has had some difficulty in establishing a portion of the hedge immediately between his house and those of his neighbors, on account of the shade, but has overcome it by extra culture, and deep trenching and draining. The plan of his extremely simple but effective garden is as follows: a border has been made entirely around the house except at the entrances, varying from one to three feet in width. The front porch is covered with Halleana and Golden Honeysuckles, *Clematis Jackmanni*, *C. Henryi*, and *C. paniculata*. The borders in front of the porch are planted with *Eulalia gracillima*, Erianthus, *Funkia Sieboldiana* and *F. subcordata* — the Funkias in front of the Eulalia and Erianthus. As all these plants are grown for form and foliage they are effective throughout the season. A group of Tuberous Begonias is also introduced in this border, and of course has to be planted every season. The border on the east side of the house is quite shaded, and consequently is planted with shade-loving plants, principally native Ferns, with groups of native Cypripediums, Trilliums, Lilies-of-the-valley, Tiarellas, and a large group of Lancifolium lilies at the end of the border where there is the most light. The garden back of the house is almost fifty feet square, but one side is perhaps sixty feet on account of the shape of the house. This garden is completely enclosed by a border, except where it is broken by the necessary path. This border, commences west of the kitchen porch steps, and follows the line of the house until it reaches the division between the front and back garden; it then crosses to the hedge, which it follows, so that there is a flower border in front of all the hedge back of the line of the house. This border is five feet wide except on the west side of the lot, where the entire space, about seven feet, is taken up, except a narrow border of grass between the shrubs and the walk. This space is planted with fifty hardy roses, mostly Hybrid Perpetuals, in thirty of the best varieties. In front of these roses is planted a narrow border, about ten inches wide, of various narcissi; among the roses, gladioli are planted every spring. The remainder of the border is planted with herbaceous plants in groups, with a selection that secures a

succession of bloom. This selection includes Columbines, Japanese Anemones, Irises, Lilies, Pæonies, German Irises, *Helianthus lætiflorus*, *Coreopsis lanceolata*, Gaillardias, *Rudbeckia hirta*, hardy Asters, Campanulas, Phloxes, Delphiniums, and *Heuchera sanguinea*. In front of these is a narrow border of Tulips, Narcissuses, Millas, etc., which is carpeted with *Phlox subulata*. Room is also found for some Sweet Peas, *Phlox Drummondii*, and Nasturtiums.

The kitchen porch is covered with Honeysuckles and Clematis and the brick wall of the house with *Ampelopsis Veitchii*. At one corner of the house is planted a Chinese Wistaria which is trained upon a single wire to the top of the house and then along the eaves. The necessary but usually unsightly posts for the clothes line, are converted into a charming feature of the garden in this way. For the posts, locust saplings about eight inches in diameter with the branches shortened back to five or six feet have been used. These are covered with Halleana honeysuckle, Trumpet creeper, and *Clematis paniculata*, one over each of three posts; and Golden honeysuckle and *Clematis Jackmanni* together on the other. As the space for flowering shrubs is extremely limited only the choicest are used — a *Magnolia stellata* and a Red-Leaved Japanese maple in the front garden, and a *Magnolia Soulangeana*, a *Magnolia conspicua*, and a Japanese Snowball in the back garden. The magnolias will in time become too large for the garden but it will be many years, and the owner is content, for the sake of their great beauty, to cut them out and replace them with smaller ones when he must.

In addition to all this planting, the lawn is filled with Croçuses, Scillas, and Snowdrops, a very pleasing way of using them.

This garden is the most effective, beautiful, and interesting in the neighborhood, yet is made on a lot usually considered too small to have gardening possibilities. It cost more than most gardens of this size but it is complete; nothing more need be bought; on the contrary the overflow of the natural increase is brightening the gardens of neighbors and friends. This garden has also privacy, which I hold is as desirable in a garden as it is in the living rooms of the house.

Suburban lots of one hundred and fifty feet frontage, and from that to an acre or two acres in extent are popular sizes in this country. Such lots admit of a combination border made with

hardy shrubs and plants — one of the most attractive ways in which they can be used. Such a border will vary of course in size, shape, and formation, with the requirements of individual places and must be designed to suit them, but let us suppose a lot of one hundred and fifty feet frontage, and two hundred feet depth, with an eastern exposure. The house is placed midway in the lot and only far enough away from the northern boundary to permit of a screen of planting. It is common to place the house as nearly in the centre of the lot as possible, but a mistake, for such a location reduces the size of the lawn and the gardening possibilities greatly. We would occupy the entire southern and western boundaries of the lot, and perhaps a portion of the eastern, with the border, which should vary in width from five or six feet up to twenty feet, with a curved outline on the lawn. This border should be planted principally with shrubs arranged in groups, but a few trees such as Birches, Magnolias, and Judas trees should be used, and a few evergreens, such as Retinosporas and quite a number of evergreen shrubs. Where a great variety of hardy plants is desired the entire margin of this border might be filled with them, but a more effective arrangement is to plant them in bold groups, one variety in a group, and alternating them with groups of shrubs. Some of the stronger growing plants such as Sunflowers, Foxgloves, and single Hollyhocks might be placed in the middle or back part of the border, and the Japanese lilies,— Auratum, Rubrum, and Album,— and our American species, Superbum, can always be planted in, and combined to advantage with, groups of rhododendrons and azaleas. After such a border is completely planted with shrubs and hardy plants there will be many opportunities for introducing colonies of spring flowering bulbs,— Tulips, Narcissuses, etc.— and the advantage of using bulbs in this way is that the planting is permanent and they are really more effective than in formal shaped beds cut out of the lawn. It is the intention to keep this border in a cultivated condition, free from weeds and grass, and to give an annual mulching of manure. A lot of this size, planted so densely on its boundary, should have its lawn kept quite free and open and have only a few choice specimens planted on it and no large trees, except street trees on the edge of the sidewalk.

I do not claim that this is the most artistic arrangement that can be made for a small suburban place. I have in mind a most

artistic place that is almost enclosed by a quite narrow planting of ordinary trees and shrubs, with a mass of trees back of the house and a single magnificent specimen tree on the front lawn. This is a satisfactory arrangement, as an example of fine architecture is satisfactory, but all the variety, interest, and pleasure of gardening is lost.

In larger grounds, where a vegetable garden and perhaps an orchard are features, the opportunities for using hardy shrubs and plants are much greater and more varied. The vegetable garden may be made the most interesting and delightful place imaginable. Usually it is simply a field of vegetables fully exposed from all points of the ground and very often unsightly. Now the vegetable garden should be concealed from the lawn and house, and this necessity at once suggests a border, or boundary planting, of shrubs and herbaceous plants as described for the smaller suburban lot. This planting should not only hide the garden but should hide its outlines, which are usually rectangular. The garden itself should be enclosed with a hedge, which should show from the inside of the garden but never from the lawn. California privet makes a very satisfactory garden hedge, but where that is not hardy, hemlock spruce can be used. Nothing makes a finer hedge than this, but it is slower growing than the privet, of which I have seen a perfect hedge five feet high made in three seasons, starting with two year old plants. A convenient walk from the house should pass through the shrubbery into the garden, and of course a convenient entrance will be made for bringing in manure, etc. A walk should be laid out all around the garden five to six feet wide, with a border for flowers six feet wide between the walk and the hedge. There should be also two walks six feet wide crossing each other at right angles and dividing the garden into four rectangular pieces of about equal size. On both sides of these walks, Grapes, dwarf Pears, and small fruits can be planted and also on the inner sides of the outer walk, if desired. The walks can be made of any material that is convenient, and need not be expensive. In one garden that I know, they are made of grass and kept as a lawn would be. I know that there are objections that can be urged against grass walks, but the owner of the garden in question does not find them objectionable, and they are certainly more pleasing to the eye than gravel walks. The border between the walk and the hedge should be given up

entirely to flowers; hardy plants should predominate, but there should be liberal spaces reserved for summer-blooming bulbs and annuals. In the hardy plants each variety should be grouped and as many sorts used as thought desirable, but in making a selection flowers suitable for cutting as well as for making a garden effect should be preferred. Such bold and striking plants as single Hollyhocks and Foxgloves should be planted in decided masses, and a border with eastern or southern exposure should be used for hybrid perpetual Roses.

A vegetable garden, arranged as described and properly cared for, in addition to being an interesting and pleasant place to visit, would furnish an abundant supply of cut flowers for the house, for the church, for the hospital, and for friends, and I think one of the keenest pleasures a garden can afford is the ability to give away flowers without stint, and the garden of hardy flowers enables one to give away plants as well as flowers, for the natural increase soon makes a surplus.

In large grounds there are often opportunities for using hardy plants and shrubs in a freer and more picturesque way than any I have suggested; that is, the planting of them in groups and masses to produce the same effects as if they were growing wild. Indeed, after the first careful planting, they should be allowed to grow wild without culture and uncontrolled. The naturalizing of hardy material does not mean that we should attempt to imitate the thickets, woods, or meadows, on our lawns. It does mean the taking advantage of a brookside for groups and colonies of Irises, Narcissuses, hardy Ferns, the splendid Superbum lilies, and the scores of beautiful things that will thrive in the grass if it is not to be cut with the lawn mower. It means the planting an irregular group of Foxgloves on the edge of a wood, or the covering a rough bank with a mass of Kalmias or native Azaleas or native Rhododendrons or with all of these shrubs together. It means the increasing the beauty and interest of the wild and rough parts of a place an hundred-fold, but considerable taste and knowledge of materials are needed to produce good results.

We must not overlook the claims of climbing shrubs and plants to our consideration. No gardening scheme, large or small, should ignore them. We can imagine a most delightful garden where they, in connection with trees and shrubbery, alone are used; and, if we consider their decorative effect, foliage, gracefulness of

growth, and the great beauty of flowers that many of them have, we must admit they are entitled to a more important place in our gardens. The free use of the Clematis family alone would give a thousand-fold more beauty than is obtainable with the most lavish use of bedding plants, and here we not only consider the large flowered type but the smaller flowered sorts as well, with their luxuriance of growth and their charming effect, when used as tree, shrub, hedge, or fence drapery. And then the Climbing Roses — what a glorious possibility here, with their showers of bloom in June.

Climbers will not exhibit their best charms if trained in a stiff and formal manner; they must, in whatever position used, be allowed to grow untrammeled. My neighbor's garden furnished a good illustration of this. He planted common Morning Glories all about his porch, with the intention of training them on strings later, but he was diverted from his intention and the Morning Glories were allowed to grow as they would. The effect was most charming; they clambered over every shrub they could reach, shared a trellis with a Clematis, and, where they could find nothing to climb on, formed mounds of green of the most tangled and pleasing description. Morning Glories, common as they are, if used rightly, produce the most delightful effects. One of the right ways is to sow them among tall grass, or among low bushes and shrubbery, and as they renew themselves annually from seed they may properly be considered hardy. As a rule vines should not be trained in a formal manner. If you would have them exhibit their best graces they must be allowed to grow uncontrolled. All know the uses that vines are commonly put to — that of covering the walls of the house, furnishing shade for porch or arbor, and the covering of screens and trellises. Besides these, almost every place of any size offers opportunities for their growth in a freer and more natural way that will greatly add to the charm and delight of the garden. Perhaps a neglected shrubbery, unsightly in itself, will afford support for such easily grown things as Honeysuckles, *Clematis Virginiana*, and *C. Flammula*, or the common wild Morning Glory, so plentiful in many places, would be quite at home here. An unsightly fence might be partly concealed and made a thing of beauty with Climbing Roses, Honeysuckles, or Clematises, or an old tree, past its prime and beginning to be unsightly, would be the very thing on which to grow such vigorous

vines as the Aristolochia, Wistaria, Trumpet vine, and the common Virginia creeper. In how many places are seen evergreens in a half dead condition, which only procrastination has spared from the axe, and as unsightly as could well be; but nothing could be better on which to grow the Large-Flowered Clematis, which furnishes a profusion of lovely bloom that no words can describe. Some vines, like the Golden Honeysuckle, planted in the grass, will pile themselves up in masses, and if any shrub is within reach will finally clamber over it, producing an effect entirely pleasing. There is nothing more charming in Nature than the combination of shrub or tree with wild vines. Who has not seen the living canopy of green formed by the wild grape over the top of some tree or the stronger growing shrubs, or how some wild vine converts a thicket of brambles, and an old fence into objects of beauty that the most ambitious gardener might copy?

It is not possible in a paper of this length even to name all of the desirable hardy shrubs and plants now obtainable, but I think it is well to give a list of what I would commend as the very best, taking into consideration their ease of culture, as well as the beauty of their bloom, form, and foliage. I know many would disagree with me as to the contents of this list, but I am confident that the beginner could make no mistake in including any or all of the varieties named in this planting list. I have tried to name these plants and shrubs somewhat in the order they hold in my esteem, but this is a difficult matter, as I am very apt to think the finest thing to be the last fine thing that I have seen.

List of Plants.

Hybrid Perpetual Roses in variety including
- Paul Neyron,
- Ulrich Brunner,
- Mme. Gabriel Luizet,
- General Jacqueminot,
- Anna de Diesbach,
- Magna Charta,
- Baroness Rothschild,
- Captain Christy, and
- Mabel Morrison,

Anemone Japonica alba,

Single Hollyhocks,

Japanese Irises,

Lilium auratum,

Rudbeckia hirta,

Aquilegias in variety,

Yucca filamentosa,

Herbaceous Pæonies — single and double, in variety,

Lilium speciosum,

Helianthus lætiflorus,

Foxgloves,

Tall Perennial Phloxes in variety,

Delphiniums in variety,
German Irises,
Aster Novæ-Angliæ roseus,
Chrysanthemums—old-fashioned hardy sorts,
Iberis sempervirens,
Lilium superbum,
" *Canadense*,
Phlox subulata and the variety *alba*,
Pyrethrum uliginosum,
Sedum spectabile,
Doronicum plantagineum excelsum,
Gaillardias,
Oriental Poppies,
Tree Pæonies,
Eulalia gracillima,
Funkia Sieboldiana,
" *subcordata*,
Arundo donax,
Hibiscus Moscheutos,
Heuchera sanguinea,
Pyrethrum roseum—single and double varieties,
Spiræa palmata,
" *Filipendula*,
Tiarella cordifolia,
Myosotis palustris semperflorens,
Helianthus rigidum,
Campanula turbinata,
" *Mariesii*,
Viola cornuta,
Cypripedium spectabile,
Native Ferns in variety.

Spring Flowering Bulbs.

Narcissus bicolor,
" Horsfieldii,
" Poet's,
" Emperor,
" Van Sion,
" albus plenus odoratus,
" Golden Spur,
" Trumpet Major,
Tulips—early-flowering single,
" Gesneriana—late-flowering single,
Milla uniflora,
Crocuses in variety,
Scilla sibirica,
Single Snowdrops.

Climbers.

Clematis paniculata,
" *Henryi*,
Ampelopsis Veitchii,
Lonicera Halleana,
Clematis Jackmanni,
Purple Chinese Wistaria,
Clematis Virginiana,
" *Flammula*,
Trumpet Creeper,
Golden Japan Honeysuckle.

Shrubs.

Kalmia latifolia,
Rhododendrons (Catawbiense hybrids),
Azalea calendulacea,
" *arborescens*,
Spiræa Van Houttei,

Weigela candida,
Magnolia stellata,
Ghent and Mollis azaleas,
Japan maples in three varieties—*sanguineum*, *aureum*, and *atropurpureum dissectum*,
Hydrangea paniculata grandiflora,
Japan Snowball,
Cornus Spathii,
" *sanguinea elegantissima*,
Lilacs in variety,
Tamarix tetrandra,
" *Chinensis*,
Berberis Thunbergii,
Forsythia suspensa,
Exorchorda grandiflora,
Desmodium penduliflorum,
Spiræa Lindleyana,
" *Reevesiana*,
" *Reevesiana fl. pl.*,
" Anthony Waterer,
" *Bumalda*,
" *Thunbergii*,
" *prunifolia fl. pl.*,
Rosa rugosa,
Althæas, Dwarf Single White, Buist's Variegated, and Double varieties,
Japan Quince,
Deutzia crenata fl. pl.,
" *gracilis*,
Hydrangea paniculata,
" *quercifolia*,
Philadelphus coronarius,
Weigela rosea,
" *rosea nana variegata*,
Forsythia Fortunei,
Golden Elder,
Rhododendron maximum,
Andromeda Japonica,
" *floribunda*,
Eleagnus longipes,
Snowberries, white and red,
Prunus Pissardi,
Hypericum aureum,
Ligustrum Ibota,
Upright Honeysuckles.

I have placed hardy roses at the head of the list of plants although they are really shrubs, but they belong in the flower garden and not in the shrubbery. None will dispute their right to the place of honor, but notwithstanding the universal admiration that is expressed for them, they are grown in but comparatively few gardens. It requires considerable effort to have them in perfection, but the results amply reward the labor. I cannot go into cultural directions, but I wish to say, and with considerable emphasis, that in my experience in growing roses, which has been as an amateur, I have found roses on their own roots much more satisfactory than budded plants.

I know that Japanese Irises and a dozen other herbaceous plants have as strong claims perhaps for consideration as the white Japanese Anemone, which has my unqualified admiration. It has

so many good qualities — individual beauty of flowers; great effectiveness in the garden, shrubbery, or border; good foliage at all seasons; a long season of bloom, and flowers that will endure a degree of frost that destroys almost everything else. Its only limitation is that it will not thrive in light sandy soil, but in a heavy, rich soil it grows with great vigor. I have often seen it five feet high and that too in places where it had been naturalized and received no attention after planting.

Why is it that single Hollyhocks are not offered for sale or grown by nurserymen and plantsmen? Surely they are the most stately, picturesque, and decorative herbaceous plants in cultivation, and I have never met anybody who did not greatly admire them, but as far as I know they cannot be bought — not even the seed. The single sorts were always very much finer than the highly cultivated double sorts, whose culture has been made difficult of late on account of the hollyhock disease. On the contrary the single varieties are of the easiest culture, and once established will take care of themselves in almost any location.

Equally neglected are the old-fashioned and really hardy Chrysanthemums, which are still to be found in an occasional garden. I know these chrysanthemums would cut but a poor figure in the exhibitions and florists' windows, but they have far more gardening value than all the hundreds of new varieties introduced in the last few years, which can only be grown in perfection by the skillful florist or by the amateur who has all the facilities of the florist.

The numerous fine exhibitions of chrysanthemums every fall are very enjoyable but I fail to see that they have helped gardening any, except that of a very limited class. On the contrary, outdoor gardening has been retarded by the disappointment of thousands of people who have tried to grow the exhibition pets in their gardens.

In a recent number of "Garden and Forest," Mr. Gerard has very properly called attention to the possible field for the hybridizer in improving really hardy chrysanthemums for garden purposes, and in a later number a writer takes exceptions to his remarks, claiming that the flowers are always damaged by frost and that their habit is straggling and poor as compared with the improved greenhouse varieties.

Now, I think we have all seen chrysanthemums in farmhouse yards and village gardens that have endured for years, and that

have, without any special culture, produced an annual mass of very satisfactory flowers and foliage, and there is no doubt that the flowers of these sorts will go through considerable frost and snow without tarnishing.

These chrysanthemums are certainly useful material for the hybridizer, but for the present we shall be very well satisfied if some enterprising nurserymen will collect from old gardens such varieties as now exist and give us the opportunity of using them in our gardens.

Before I conclude I wish to give aspecial word of praise to my favorite shrub, *Kalmia latifolia*, which is known in Pennsylvania, where it is very common in the woods, as the small-leaved mountain laurel. It is greatly admired as a wild flower, and an occasional unsuccessful attempt is made to transplant it from the woods, but nurserymen have made no attempt to introduce it into general culture, and it is somewhat curious that it is necessary to send to England to get fine specimens of this distinctively American plant. Excepting odor, it has every good quality that a shrub can have — evergreen foliage and good habit, great quantity of durable bloom, extreme daintiness and beauty of individual flowers, and usefulness as cut flowers. If the flowers are cut just as the buds are about to open and placed in water they will last for two weeks in the house, and if arranged with taste nothing is more decorative.

In one of his books Donald G. Mitchell suggests that the Kalmia would probably make an excellent hedge. I have never seen it tried but I am confident that it would — perhaps as fine as the holly hedges in England, and, with a little discretion in trimming, a hedge of it could be made to produce a fine crop of bloom at least every other season.

With nursery-grown plants to start with, the Kalmia is of the easiest culture, requiring no special soil or location, and it is perfectly hardy. Like all evergreen shrubs it should be transplanted in the spring.

All the hardy plants I have named, with two or three exceptions, will thrive with ordinary garden culture, and some of them without any attention after planting, but as they are usually planted where they are to remain for years it would be well to make the initial preparation of the soil for them a liberal one. I usually specify that borders for hardy plants should have two feet of good friable

soil mixed with one-fourth its bulk of rotted stable manure, and that they should be prepared in late summer or fall, and the planting done the following spring. Fall planting of hardy plants is often recommended, but my experience is that many plants are winter-killed after fall planting that are quite hardy after having the benefit of a growing season to establish themselves. Of course special plants require special treatment; for instance, the bulbs of the Auratum lilies should not come in direct contact with manure, and the fine double and single varieties of *Pyrethrum roseum* should be planted in beds raised a few inches, to prevent their rotting out in cold, wet weather.

I would advise the same liberal preparation of the soil for shrubs that I do for hardy plants, though in many instances the expense would be prohibitory or thought so, but in any event I should insist on the ground being subsoiled or trenched and a liberal application of stable manure being made. An annual mulching of manure is beneficial to both shrubs and hardy plants.

I have had a somewhat extended experience with Rhododendrons, and my opinion of the proper soil to grow them in may be worth something. Their beauty is now pretty generally known and appreciated, but they are popularly considered tender and difficult to grow. This is largely owing to the selling of improperly grown plants and tender varieties, and to late fall planting, which is very apt to be fatal. I have found that when Catawbiense seedlings, or the well-known hardy named varieties, grown on their own roots from layers, were planted, there was no difficulty in growing them in any ordinary soil or in any position except immediately under old established trees. I have seen them grown with peat and with leaf mould, but the best results I have ever seen in this country were where an excavation two and one-half feet deep had been made for them and filled in entirely with turfy, fibrous sods, chopped up, and allowed to stand over winter before planting. No manure was mixed with the sods, but after the rhododendrons were planted a mulching of rotted cow manure was applied to the surface of the soil.

It seems to me I have said a great deal about the merit of hardy plants and shrubs, and but very little about their culture, but it must be remembered that my mind is more occupied with the designing of gardens than with their care, and I think it is quite

as important to create an interest in hardy material as it is to teach how to grow it. Cultural skill will soon follow enthusiastic desire, which your Society is doing so much to create, and when we can have horticultural societies of like intelligence and breadth of object in all our large cities the advancement of the best gardening will be rapid.

DISCUSSION.

In reply to a lady questioner, Mr. Elliott said he would not attempt to transplant lilacs which had been growing fifty years. He was decidedly opposed to transplanting either old trees or shrubs. He had observed that the results were always unsatisfactory, and that young vigorous stock planted in extra deep and rich soil always gave quicker and better results.

Henry L. Clapp expressed his strong interest in hardy herbaceous plants and shrubs, especially in the Golden-rods, Asters, Hardy Chrysanthemums, and Clethra. These plants, under culture in the George Putnam School Garden, have given great satisfaction. The *Aster lævis*, which was carefully cultivated, became a mass of flowers. The *Solidago Canadensis* came up in the yard, attained the height of seven feet, and spread out wide enough to fill a hogshead. They had fourteen varieties of Golden-rod and eighteen varieties of Asters. The purple Asters have proved quite successful. One, the *Aster Novæ Angliæ* L., a seedling, made a growth as large as a barrel. Indeed, the unexpectedly large growth and brilliant colors produced by these plants, led many outside persons to inquire about this garden of hardy plants. There is no finer yellow than that of the Golden-rods, and no finer purple than is shown by the *Aster Novæ Angliæ*, and when grown together they make a fine combination of color.

Being asked whether the California Privet is hardy at Boston, Mr. Elliott said he could not answer that question definitely. He thought, however, that it is not reliably hardy north of the latitude of New York.

William C. Strong had seen many hedges of California Privet, that were quite hardy and flourishing; others also that were not. The plant is largely used at Newport, R. I. Its success depends upon a good summer growth, and ripening of the wood.

In answer to a question regarding the disease that destroys many hollyhocks, Mr. Elliott said the disease was confined mostly

to the double varieties. He had not seen any single flowered hollyhocks attacked by it.

Mr. Strong spoke of several evergreens, among them *Kalmia latifolia*. He had nothing to say against the latter. It disappoints many persons, because they do not treat it properly. It is naturally a moisture and shade-loving plant, although after becoming well established it will endure bright sunshine.

Mr. Elliott said that although *Kalmia latifolia* usually grows wild in the woods, the best growth and greatest beauty of flowers of this plant he ever saw was in a space of cleared forest where it had grown up thickly, exposed to the fullest sunshine. He had seen it in a garden, and also in nursery grounds where it was growing better than it usually does when in a wild state. He had found that, like the Rhododendron, the Kalmia likes plenty of sunshine, but also like the Rhododendron it does best in a deep, moist but well drained soil.

Mr. Strong alluded to the fact that it grows on mountains, but water often abounds there; their being exposed to full sunshine under such circumstances is a very different matter from taking them out of their native soil, and replanting them not only in a strange soil but in the full blaze of sunshine.

O. B. Hadwen had taken many of these plants from the pasture, and planted them in open ground in the autumn months from September to November, and lost very few. But he always takes up a ball of earth with each root he transplants. It does not succeed as well in the shade of trees as in clear sunshine, but flourishes best in the trenched ground of a Rhododendron plantation. He esteems the *Kalmia latifolia* highly, and would like to have it selected for the State Flower. No flower surpasses it for a picture. He had been much interested in the paper read today, and took no exceptions to it. But there was one omission he would mention: the old-fashioned red Pæony, which is one of our best hardy flowering plants. He has a bed of it, about ten feet in diameter. They come up annually and produce a most brilliant display, which affords much enjoyment to him.

MEETING FOR LECTURE AND DISCUSSION.

SATURDAY, February 9, 1895.

A Meeting for Lecture and Discussion was holden today at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair. The following paper was read by the author:

GLASS HOUSES, THEIR CONSTRUCTION AND HEATING.

By HENRY W. GIBBONS, New York.

I have the honor of being permitted to present to your attention this morning a paper entitled "Glass Houses, their Construction and Heating." Under this heading come not only such structures as are used for the purpose of raising plants or bloom for profit, but also greenhouses designed both for useful and decorative purposes on private estates; from the small amateur greenhouse for beginners in the art of floriculture, to the imposing ranges of palm and other houses on the estates of men of large wealth.

The owners of greenhouses for either of the above purposes have in the past been continually asking for structures more permanent and economical, more effective for the purposes intended, and more decorative and artistic in design than has heretofore been obtainable. It is today the aim of the leading horticultural architects and builders to satisfy these demands, and I feel gratified in saying that the art of greenhouse design and construction — for it is truly an art — has reached that point which enables us today to construct a house that is as near perfection as we can approach. Of course, in this perfection there are many grades, the grade being decided by the objects for which the houses are intended, the value of the land upon which they are to be built, the amount of money to be invested, and many other considerations.

I shall divide this essay into two parts. In the first, I will call your attention to houses constructed for the use of the commercial grower, and in the second to those designed for private use.

COMMERCIAL GREENHOUSES.

As the primary object of such structures is profit, a great deal of careful thought and consideration is necessary in their design, location, and erection. Competition in floriculture is

today so close and sharp that the grower cannot afford the expense of the continual repairing and rebuilding which was practised under the protection of extravagant profits; therefore we must look for structures as permanent as possible, and at the same time not requiring a prohibitive amount of capital for their erection. The perfect quality of plants and bloom now demanded by the purchasing public compels us to design houses of such shapes and dimensions and so arranged as to location and furnishing in the matter of light and heating and ventilating facilities, as will produce the best results. Thus we see that the vital requirements of a commercial greenhouse are *economy* and *adaptability*. By the expression "economy" with reference to such structures, two distinct impressions seem to be conveyed; one indicating low first cost, which would result in the greatest profits in a short time; the other, which is the more correct impression, indicating the lowest first cost which will result in a reasonable profit for the longest period.

We will now consider the construction of greenhouses coming under this first impression, which, for lack of a better name I will call "Temporary Economy," as against the second impression, which I will name "Permanent Economy."

Temporary Economy. A grower starting in business with a limited amount of capital is compelled to build under the temporary economy style, and the best construction for that purpose is that known as sash-bar construction. Fig. 1, gives a reasonably clear general idea of this style of construction. Posts may be of various woods, such as locust, cedar, cypress, or chestnut, the first being the most, and the last the least durable, and the average cost would be about in the same order. My preference is for cypress, as it is easily procured at a reasonable price, and is of very lasting quality, whereas locust and cedar are in many localities unprocurable, and chestnut is not sufficiently durable for this purpose.

It would be well here to consider the kinds of woods best suited for the complete construction of such houses. I would say, without hesitation, use cypress throughout, but be careful what kind of cypress, for there are various grades of this wood, some of them being of an exceedingly open and woolly nature, difficult to work, and having a tendency to warp and twist, which renders them unsuitable for greenhouse work. I think without doubt the

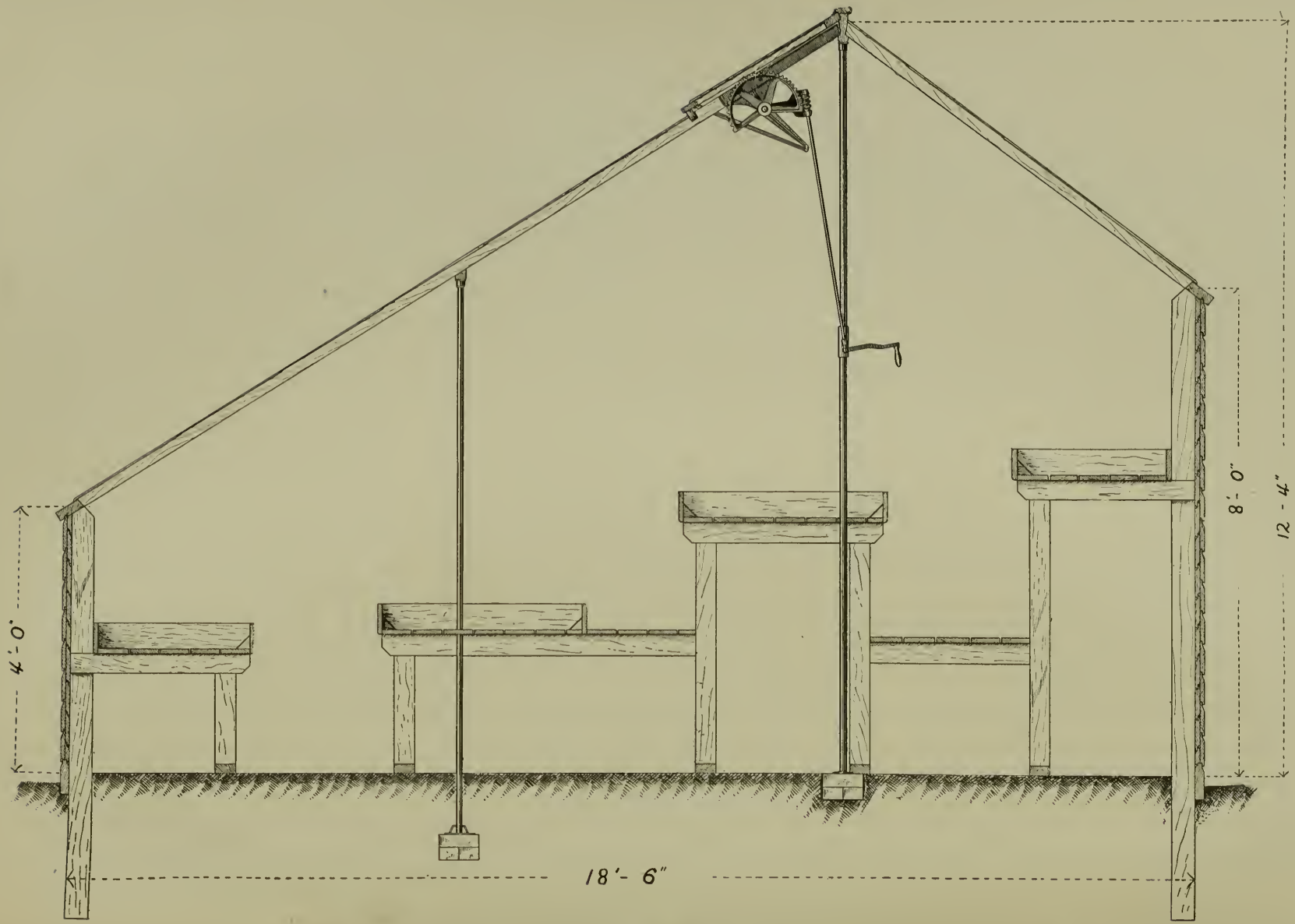

Fig. 1. "Sash Bar" Rose House.

best for our work is red cypress — that which comes from the Gulf States, it being of closer fibre, greater strength, elasticity, and durability, and, therefore, much to be preferred to the white cypress of the Central States. Cypress absorbs water very easily, and if well seasoned and air-dried gives it up freely without detriment to the wood, but if kiln-dried the absorption of moisture will be very excessive, and cause much trouble by warping, twisting, and undue swelling of the wood when wet. I would strongly advise those contemplating the erection of their own greenhouses, not to purchase cypress from their local lumbermen, for cypress handled by them if not *always*, is, in *almost* every instance, kiln-dried stock, as this is the only stock in demand by the general building trade for interior finish. I would suggest that you either buy from the producers, emphasizing very positively that what you wish is air-dried and *not* kiln-dried stock, or from some reputable firm of horticultural builders, who carry a stock of sizes and grades best suited for the purposes in view.

We do not know the durability of cypress under the conditions found in greenhouse construction, but we do know that it lasts much longer than any material heretofore used.

Having satisfied ourselves as to the material, we will now pass to the details to be used in the construction of the house under consideration, which is generally known as a Sash-bar house. The most serviceable size of posts for a greenhouse, say about eighteen feet and six inches wide, is two by five inches, and they should be placed from four to four and a half feet apart; in many cases they are placed from six to eight feet apart, with a two by two-inch intermediate post, used centrally between these main posts to give stiffness and nailing facilities for the siding. The posts should extend to a depth of from two and one-half to three feet below the ground line, the depth depending on the nature of the soil, and the latitude in which the houses are being erected. The height will be governed by the purposes for which the house is intended; for ordinary greenhouse purposes, if provided with glass below the eaves, either movable or stationary, the height should be about four and one-half feet above the ground, but if solid board sides are desired, as in the house under consideration, the height of the posts need be only about four feet, and that on the north side of a three-quarter span house eight feet. These dimensions usually give ample height above the

side bench, and allow of good head room in the side path. As wooden gutters should, in all cases where possible, be avoided, they being the first part of a house to rot out and cause all parts with which they come in contact to decay with them,—and these parts of the house are very vital as a usual thing,—we will consider a house without gutters. Iron gutters may be used, but they will come under the heading which I have named "Permanent Economy," and will be considered later. If, however, the rain-water is of such value that the wooden gutters must be used, I would suggest their being made from the solid stick, usually four by seven or eight inches, the gutter parts being dug out, and the gutter attached as an independent part, which may easily be removed from the house at any time without detriment to the structure. The tops of the posts should be cut on a line to correspond with the pitch of the roof, usually seven and one-half inches to the foot, rising at an angle of thirty-two degrees, or, in the case of the north side of a three-quarter span house, about thirty-seven degrees.

The order in which the several parts of a greenhouse are assembled or set together varies with each builder, each adopting that method which he finds gives him the best results. These methods vary with the class of mechanics available, and also with the customs in vogue in the various sections of the country. No set order that I could describe would meet with approval in all sections; so I will proceed only to describe the several details which enter into the construction of the houses, and for convenience will start at the ground line and work up.

We have already described the posts, and will now consider the siding. The first or inner siding should be of that shape known as "beveled ship," its section being such as to make a tight joint, which does not show the effects of expansion and contraction, and principally one which affords no lodgment for water. This siding should be nailed directly to the outer side of the posts, care being taken not to make the joints of two lines of boards one directly above the other on the same posts. The usual practice is to start the upper line with a full-length board, the next with a half length, the next a full length, and so on, downwards. Many use a narrow, tongued, grooved, and beaded vertical ceiling for the inner boards, but I do not approve of this practice, as it creates so many more joints and recesses for the reception of moisture,

which is held in them by capillary attraction, this being in such cases with small quantities of water greater than the attraction of gravitation, thus causing a much more rapid decay than would occur with the use of the beveled ship siding above described, besides not giving the house the longitudinal bracing and stability so very desirable in such a structure.

For the outer siding two patterns of milling are in general use; seven-eighths-inch clapboards, and novelty siding. The latter makes the neater, warmer, and more durable covering. This second, or outer, siding should be divided from the inner by means of some non-conducting material. I think the best for this purpose is a good grade of rosin-sized building paper. A grade weighing about one-twelfth of a pound per square foot would be very well adapted. This paper should be tacked directly to the inner siding, and the outer siding should be nailed directly over this, care being taken to mismatch all joints of each of the sidings, and make all vertical joints over main or intermediate posts. It is a very bad practice to nail to the inner siding only, as the nails will push through and present a very unsightly appearance, allowing moisture to settle on the breaks thus made, and causing rust and premature decay; also not giving sufficient hold to the nail, and allowing the outer siding to be drawn off if it has any tendency to warp caused by the heat of the sun or by outer moisture.

The next detail to be considered is the eaves-plate or, as many call it, the lower glazing strip. Its size and shape vary somewhat under differing circumstances. Its main object is to afford a support for the glass and glazing bars, and make a weather-tight connection between the board sides and the glass roof. A very convenient size and shape for this piece, in the house under consideration, would be six inches by two inches, having on the under side two plow grooves, the lower and larger one being for the reception of the upper edge of the outer siding; the upper one, a small groove about a quarter of an inch square, to act as a break, and prevent the waters of condensation from the roof reaching the siding, the groove causing the water to fall at that point. On the upper side, no special milling is necessary, but the two edges, especially the upper one, should be cut to a slight bevel. This is to give a bearing for the glazing bar. If your wood is being machined in a well-appointed mill, I would also

advise the beveling of the lower edge, so as to reduce as much as possible the exposed surface of this stick, to which the moisture would be liable to freeze, causing ice to back up under the edge of the lower lights of glass and break them.

Next in order comes one of the most important details of the house, the roof glazing bars, or as they are generally called, the "sash bars." The object of these bars is to support the glass, and for this purpose a light section of lumber only is required, its dimensions being governed by the length of the bars to be used without the assisting support of a purlin. I find in ordinary practice, assuming that sixteen-inch by twenty-four-inch glass is being used, for bars having a distance of about five feet between supports, one and three-fourths inch by one and one-eighth inch is ample, and for those whose supports are eight feet apart, two and one-fourth by one and one-eighth inch is well suited, having ample strength for the strain brought to bear upon them, and yet being of such dimensions as to cast but little shade. These bars should have on their upper edges suitable rabbets for the reception of the glass; the bottom of these rabbets being made in the shape of a V as a receptacle for the putty necessary in glazing. A groove is also run in each side of the bar to carry off the water caused by the warm, moist air of the house striking the cooler glass surface and condensing, and thus preventing its falling on the plants and causing injury.

I wish here to call your attention to two very important points to be considered in designing or erecting greenhouse structures: first, avoid as much as possible any detail which will throw shade, and, second, avoid all recesses, mortises, or other places where moisture may find lodgment. Both of these items are of the utmost importance, yet are generally overlooked by the novice in greenhouse building, and I am sorry to say are often neglected by older heads, particularly the latter items,— mortises or other places for lodgment of water. If you desire to use bars which are provided with the groove on each side for the carrying off of the waters of condensation, as just described, be sure that the outer sides of this gutter or groove at the lower end are cut away so as to allow the water to drop out just before reaching the eaves plate, or glazing strip, or entering any joint which may have become opened from various causes, thereby producing premature decay. This small feature of cutting condensation grooves at the

lower end is of the most vital importance, its observance or neglect making a difference of many years in the life of a glass house, and yet I never remember having seen it practised by any other builder than myself.

Next in order we come to the purlin. This may be of wood, about two by three inches if desired, but as the cost of an iron purlin drilled to accommodate the correct spacing of the glazing bars for the proper reception of the glass, is so very little in excess of that of the wood purlin, and considering that the iron will cast much less shade than the wood, I would advise giving it the preference. If an iron purlin is decided upon, and you wish to order from a firm of experienced greenhouse builders, send them a small piece of the bar you intend using, state the size of the glass, and trust them to drill the purlin correctly. They will also arrange for suitable splicing of the iron, and for caps to receive your iron pipe columns, which are necessary to support the purlins. If, however, you desire to do the drilling yourself, or have your local mechanics do it for you, to the width of bar in sight between the rabbets, usually about half an inch, add the width of the glass, say sixteen inches plus one and one-sixteenth inches, for play; this will give you sixteen and nine-sixteenths inches between centres of bars, and this will be spacing of holes necessary for securing bars to purlins. The size of the holes should be three-sixteenths of an inch, which will accommodate the No. 8 round-headed screws. The section of iron best suited for the purlin is two by one and one-fourth inches by one-fourth angle; if this cannot be easily secured, one and three-fourths by one and three-fourths inches by one-fourth angle may be substituted. The size of the columns for the support of these purlins, depends upon the extent of roof they have to support. For the southern slope of an eighteen feet six inches wide, three-quarter span house, one and one-fourth-inch gas pipe will answer, or, for each slope of an even span house of the same widths, one-inch pipe is ample, placed about eight feet apart.

We next come to the header which makes the connection of the roof ventilating sash and the roof. In houses such as we are now considering, I prefer to run all bars up to the roof and fit the header over the bars.

The ridge of such houses as these plays a very important part, as on it devolves the duty of giving and maintaining a true roof

line. Of all the parts of the house, it is most important that the ridge should be of perfectly air-seasoned timber. It should be sawn from a sound log, straight and true to the grain, and free from heart or sap. If you are unable fully to meet these requirements, in cypress wood, which is often difficult, I would advise the use of yellow pine. In fact, in my own practice, I use yellow pine exclusively for this purpose, as I realize the great difficulty in securing a straight line with cypress, under the peculiar exposures and conditions which surround the ridge of a glass house. The ridge should be two by six inch plank and machined as shown, one side being arranged for the reception of the ventilator, and the other for that of the roof glass and bars, as shown. A suitable cap three by one and one-half inches, machined as indicated, is securely fastened to the upper edge of the ridge.

We will next consider the ventilating sash. For ordinary sized houses they should be three feet deep, and continuous on either or both sides of the ridge. The point at which these sashes should be hinged, whether at the top or the bottom, does not admit of much discussion, as each method affords equal ventilating conveniences, and the advantage gained by hinging to the ridge and relieving the bars of the weight of the sash is so obvious that this method is recognized as the standard, although there may be isolated cases in which the geographical surroundings are such as to make the hanging of the sash at their lower edge desirable. But these cases are so few that this method needs no further comment in a general discussion.

The cap described has three objects: first, to protect the ridge, and help it keep its alignment; second, to support the sash; and third, to make the joint between the sash and ridge weather tight. The ridge of a three-quarter span house of the above class requires support by means of one and one-half or two inch pipe columns, or three by three inch wood posts, about every eight to ten feet.

Iron-Frame Greenhouses.

We will now pass to the more important style of commercial construction, which comes under the head of Permanent or True Economy, and is generally known as Iron-frame construction, the object in view being to make as much of the structure as possible practicably indestructible, but at the same time bearing in mind the requirements and conditions which are peculiar to greenhouses.

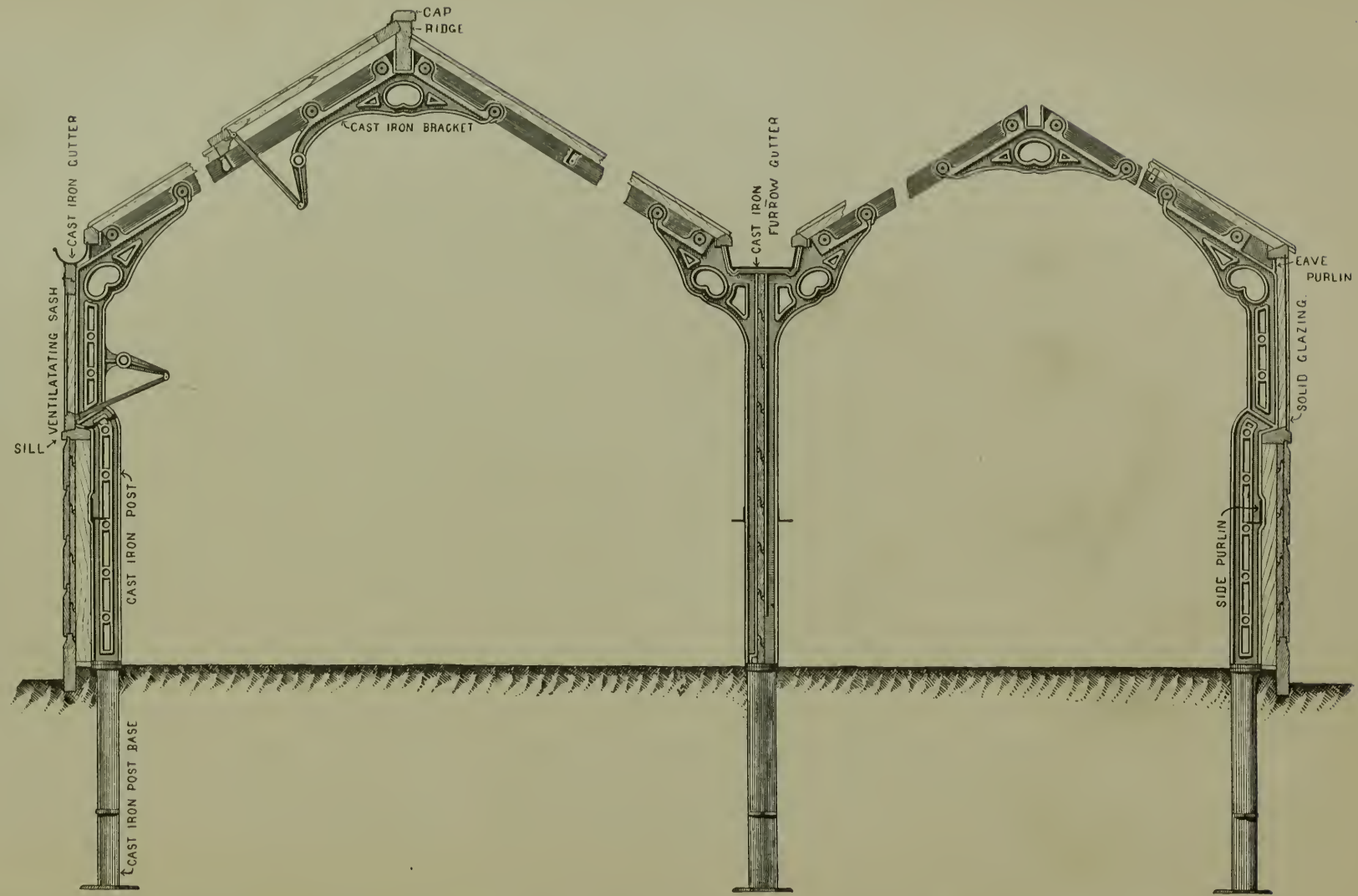

FIG. 2. SHOWING CROSS SECTION AND DETAILS OF IRON FRAME GREENHOUSE CONSTRUCTION.

It is the lack of a thorough knowledge of these conditions with builders and architects in general, that is responsible for the thousands of greenhouses throughout the country which are practically useless for the purposes for which they were built, and has thus caused loss of interest in plant culture, in addition to the loss of dollars, to those who otherwise undoubtedly would have been the means of materially furthering the interest of the public in matters horticultural, and consequently would have helped to create a greater demand for the products of our commercial growers. I mention these facts just here in order to emphasize the advisability and necessity when building glass houses, of first making yourself acquainted with the most perfect methods of construction; and without question, the easiest, quickest, cheapest, and in every way the most satisfactory means of doing this is to consult some prominent and progressive firm of horticultural architects and builders — men whose whole thought and energy are bent in this particular direction.

The details for a perfect iron frame for a commercial house may be seen by Fig. 2. It will be noticed that for the foundation a cast iron post base is used, which may be made of any desired length, according to the nature of the ground upon which the house is to be built. The post bases are usually about two feet, six inches long, and are set into the ground to their full depth, the tops being about on the level of the floor-line of the house. To this base is bolted an iron post, the post in this instance being that used by Messrs. Hitchings & Co. in their improved patented construction. Other styles of iron posts may be used, such as the ordinary angle or T iron of commerce, but care must be taken to select them of such a shape and of such dimensions as will not only support the dead weight of the house but also have no tendency to warp, sag, or twist, in case of strains being brought to bear in other directions than vertically as above stated. The advantage of the cast iron post, in addition to being designed with a view to convenience of attaching other parts of the frame to it, is its great stiffness, strength, and general adaptability.

We will now pass to the rafters. I find in general practice when a suitable bracket is used for connection of rafter and post, and of rafters to each other at the ridge, that where the length does not exceed seven feet between supports, (except in the case of grapery roofs) a section of flat iron two inches by one-half

inch is ample; where supports are from seven to eleven feet apart, two and one-half-inch by one-half-inch iron will serve, and so on.

The rafters are tied at their upper ends by iron brackets which have a recess or socket to receive the wooden ridge already described. I have often been asked why I do not use an iron ridge, and I suppose this question has come to the minds of many present, when considering this subject. An iron ridge is unnecessary, and presents many objectionable features. A wooden ridge and cap of some description are necessary for the weather-tight and proper connecting of the ventilators and roof, and to add an iron ridge, of such dimensions as would give to the building the stiffness and stability that a two by six-inch yellow pine ridge will, would so add to the amount of shadow thrown upon the house as to be prohibitive; it would also entail additional and unnecessary cost. The bracket should also have conveniences for carrying the shaft of the ventilating apparatus. We have then in this bracket a combination of three parts. First, a convenient and practicable tie for the rafters; second, a suitable means for connection between the ridge and the iron frame; and, third, bearings for the vent shaft, combined in one casting, which not only causes a saving of first cost, but a saving of labor in the course of erection.

These pieces comprise the main supporting trusses of the structure, and we will now consider the parts which are requisite for the tying of these trusses or sections together, and for the support of wood and glass on those parts between trusses, which as I have before stated are placed eight feet, four and one-eighth inches apart. This is for glass sixteen inches wide. If narrower glass is used, a lesser spacing of the trusses will be necessary.

The posts are tied together by means of two lines of angle iron purlins, the lower of which is placed about one foot, six inches above the ground, and is of three by two inches by three-eighths inch angle. Its uses are, first, to tie the posts together, and, second, to give support to the two-inch by one and one-fourth inch by one-fourth-inch angle eaves, or gutter purlin and plate above, by means of a light intermediate post connecting the two together. These two purlins so connected give ample support to that portion of the roof below the lower roof purlin; also to the gutter and header supporting the side ventilating sashes. The lower purlin is also used as a back support for the side bench, and thus obviates the necessity for any back legs, or for attaching this

bench to the wood siding and thus causing early decay at such connections.

For the connecting of the rafters, giving longitudinal stability to the roof, and for the support of the glazing bars, two inch by one and one-fourth inch by one-fourth inch angle iron purlins are used. This size of iron is selected, as the two-inch web gives the necessary strength, and the one and one-fourth inch gives sufficient surface for the attachment of the roof bars by means of small screws, yet throws but little shade. These purlins are spaced according to the length of the rafters, and the size of the glazing bars in use, the upper one being so placed as to afford support for the upper ends of the glazing bars, they all resting on the purlin about one-fourth to three-eighths of an inch, and being toe-nailed to the cypress header which is screwed on the purlin.

The ends of the house are braced with one, two, or three lines of purlins, according to the width and shape of the house. Iron doorposts fastened to cast iron bases in the same manner as the side posts, run up to the rafter and are tied together by a cast iron doorsill at the bottom. The end purlins just mentioned run from the end posts and rafters to the doorposts, thus forming a very stiff end, and one to which the necessary light woodwork is easily attached.

We now come to the last part of the iron frame, but I think one of the most important, namely the gutters. The gutters should be of iron, but even that would be of no advantage unless we could prevent their contents from being frozen, for, as we all know, in the process of freezing expansion takes place, which is liable to burst or crack the gutters. I show here, however, a non-freezeable gutter, of cast iron. It is so arranged that a small portion of the inner warmth of the house is conducted to the contents of the gutter, and thus prevents their being frozen. These gutters are in use very largely throughout the country, and I have never known in a single instance of their contents becoming frozen sufficiently to prevent a free flow of water. I have, in very low temperatures, ranging from zero downward, seen the outer surface of the gutter coated with ice, but the warm side is at all times free. This is a very important feature. First, it is a permanent portion of the house, whereas the old wooden gutter was the first part to rot and communicate decay to all its surrounding parts. Second, it prevents the possibility of ice forming

and continuing up the roof between the lower laps of glass, and by its expansion causing considerable breakage. Such breakages are at all times expensive, but especially at such times as this, when the temperature is low and the cold currents of air passing through the broken glass may cause great damage to, or loss of plants or bloom. Third, they provide at all times a free passage for water from the roofs to drains or sewers, or, in many cases when it is valuable for irrigating or other purposes, where a supply of water under pressure cannot be obtained, to suitable tanks or cisterns, built within the houses. They also prevent the unsightly slopping over, which takes place with gutters whose first contents have become frozen.

We will now consider such details in the woodwork in connection with an iron frame house as may be different from those already described in connection with the "All-wood," or "Sash-bar" house. We find first the sill against which the side ventilators close; this is of a shape well known to all, and is cut from a two by four-inch joist, the under side being milled with a plow groove for the reception of the upper edge of the inner siding, and two smaller grooves to prevent water creeping along under the sill inside and running onto the boards. The upper side has the usual rabbet for the sash to shut against, about one-half inch deep, and the surface is beveled to shed water. The side ventilator is of various depths for different purposes; generally about twenty inches, the top rail being rabbeted, as is also the small header which makes connection between the sash and the gutter. This rabbeted joint makes a very weather-tight and close connection. The eaves or gutter strip is screwed to the upper surface of the eaves purlin, and is fitted with a plow groove on the under side, for the reception of the gutter's upper edges, which act as a weather-break. The upper surfaces are beveled, the outer one to the pitch of the roof, and the inner at such an angle as to give support for the foot of the roof bars.

At this point, I wish again to caution you against the very common practice of having mortises cut in the strip for the reception of the roof bars. This mortise and tenon style of connection is very largely used, yet it is without question the feature which leads to the first and most serious decay in a glazed roof, no matter how perfectly we may make the tenon fit into the mortise, or how careful we are to have all such joints painted

before connection. A large proportion of such joints, under the varied changes and strains to which they are subjected, will open, and, be it ever so little, it is fatal to that part of the roof, as moisture will accumulate in the mortise, remain there, and the result will be as I have stated,— premature decay.

The next, and I believe the last, feature of the woodwork, excepting the doorposts, which differs from the construction already described, is the piece known as the roof ventilator header; it is really the roof bar header. The section of this is shown in Fig. 2. It is securely screwed to the purlin, leaving about one-fourth to three-eighths of an inch of surface on the lower edge of the purlin for the support of the upper ends of the roof bars, as before described. It is generally from this purlin that all drip of condensation formed upon the roof-vent accumulates, and falls to the plants below, causing considerable damage, and it is to avoid this annoying drip that we use the peculiar shape of header here shown. The object of the rabbet or groove on the upper side is to collect all drip from the lower rail of the ventilator and by means of small channels cut through to the outer air to carry such water onto the roof. One would expect these channels to become frozen up and useless in severe weather, but such is not the case. The little current of warm air which is allowed to escape through these grooves prevents them from becoming clogged with ice.

Glass Houses for Private Estates.

I think I have considered the construction of commercial houses sufficiently for the present, and as the glazing, painting, heating, and ventilating of both commercial and private structures are the same, I will consider them later under their separate heads, and will now pass to the construction of glass houses designed and arranged for use on private estates.

The construction of such houses differs very slightly from that of the iron frame commercial house just described, the principal difference lying in the fact that they are usually built upon brick or stone walls instead of having posts set in the ground, with the double-boarded sides.

In the past many styles of both solid and hollow walls have been tried, but it is now an established fact that the only wall suitable for greenhouse foundations is a solid one from twelve to sixteen inches thick, according to the weight or thrust it is

intended to support. Great care should be observed in the bonding of such walls. Undoubtedly the best bond for such purposes is that known as "Old English," which consists of alternate headers and stretchers, the objection to this being that as the dimensions of bricks vary in different localities, many are such as to make it difficult for the mason to prevent several vertical joints coming directly over each other, and thus causing a weakness in the wall. This difficulty can, however, be overcome if a little care is exercised and the mason when finding joints overrunning will cut a brick or two to bring joints into the desired position. The next manner is to make every third course of headers; this finds preference with most masons, and gives a good, substantial foundation.

Theoretically, hollow walls are warmer than solid ones, but in practice they are colder and much weaker, and will be found a source of constant trouble and annoyance, unless you are willing to make both sections eight inches thick, which, with the addition of the air space would make a wall twenty inches thick, and besides being very costly, would occupy more space than we should care to devote to such a purpose.

The difficulty with the hollow wall, as ordinarily constructed, *i. e.*, two four-inch walls with a two or four-inch air-space between, is that the action of the elements on the outer wall, and that of the heat and moisture on the inner wall soon cause the joints to crack, thus allowing a circulation of air to take place between the walls, which destroys the looked-for warmth caused by the nonconductiveness of the dead air space, and the variable strains brought to bear by expansion and contraction, heat and cold, dryness and moisture, on the two four-inch walls are such as soon to break all bond between the bricks; and unless the two walls are so tied together as to be practically solid, they will bulge and warp, and endanger the entire superstructure.

I would particularly caution you against the use of a single face of four-inch brick on the outside; if any particular color or make of brick is desired, for the sake of appearance, make the outer headers, as well as the stretchers of such brick, and see that the inner brick are of the same size as the face, or make the entire wall with the special bricks. No amount of wire or metal ties will take the place of brick bonds in a greenhouse wall. This same caution pertains to the facing of the inside walls with white enameled bricks, which give a very nice and clear effect. If such

bricks are desired, see that they are exactly the size of the others you are using, and enameled on such of their several surfaces as to enable you to get one of the bonds above described. A good mortar for greenhouse walls is composed of two parts of clean sharp sand and one of good Rosendale cement.

Upon the foundations, which usually extend above the ground to about two feet six inches, a heavy cast iron sill is set in equal parts of Portland cement and sharp sand. With such a sill, having the centre web below the rabbet which rests on the wall and becomes embedded in the cement, any cross movement of the sill upon the wall is prevented, and no anchor bolts are necessary.

The iron frame of the superstructure, which is in general similar to that already described, is bolted securely to this sill.

The woodwork used upon these houses is of the same general shape and detail as that already described, but is preferably of clear white pine, in order that a higher finish may be obtained, as cypress, no matter how carefully and smoothly it may be milled, becomes woolly and rough by contact with moisture, and this prevents its use in greenhouses where a permanent high finish is desired. In curvilinear houses the iron rafters should be bent to fit the roof lines, and this bending, except in the case of a very large radius being used, should be done while the iron is heated to a proper and even temperature; otherwise, its strength is greatly impaired. Of course great care must be exercised in the heating of iron for such bending, and ovens and other conveniences especially designed for this purpose are necessary to prevent an uneven heating or burning of the iron, which would be equally as destructive to its strength as would the cold bending.

Glazing. I will now pass to some important details in glass houses, and first the glazing. The first thing necessary is to get suitable glass. For roses, and other plants which require the most perfect light, I would certainly recommend the use of French or Belgian glass — that known generally as double thick, second quality, the first quality being too expensive and not possessing any material merit for plant culture other than that possessed by the second quality. For other greenhouse purposes, I believe glass of American manufacture is well suited, and have no doubt that the time will soon arrive when we shall be able to compete in quality, as in price, with glass of a foreign make. I think that the only reason our domestic factories do not produce

glass equal to that of foreign competitors is the higher cost of labor, but improved methods of manufacture will soon equalize these matters. The advantages of foreign over domestic glass are chiefly greater clearness, toughness, or strength, and absence of waves.

Methods of Glazing, etc. There is only one perfect method of glazing for greenhouse work, and that is with light wooden bars, and the glass bedded in suitable putty. The bars should be so rabbeted as to leave a V shape, the putty being rubbed into the V, and the glass then rubbed and pressed down firmly, until the lower side rests on the sharp edge of the wood, and solid zinc shoe nails or other suitable points are driven into the bar above the glass to prevent its displacement. The surplus putty both above and below the glass is then carefully cut away, and in painting, the paint should be laid on thickly over that putty which may be exposed on the upper side between the glass and the bar, and also on the glass which is directly over the bar. This effectually preserves the putty in the joints from the detrimental action of the atmosphere.

A system which, at first sight, and to the uninitiated, appears to have extraordinary merits, and yet which yearly causes a great waste of capital, and is the source of great annoyance to those who employ it, as well as regret to those who have innocently advised its use, is that known as the metallic glazing. There are many systems of such glazing on the market, both patented and otherwise, but, my friends, I cannot advise you too strongly against the use of any one of them, or any so-called improvement or modification of them.

In order that you may realize the defects in this system, I will ask your attention to the following points: First, because of the unyielding surfaces of both glass and metal (soft sheet lead excepted), it is impossible to get a perfect contact one with the other, and without perfect contact a perfect and air-tight joint and security of the glass is impossible. An air-tight joint may be made by the intervention of sheet rubber, sheet lead, cotton saturated with white or red lead, and many other substances, but it is only temporary, as the effects of moisture and variation of temperature will soon cause decay on the one hand, and the continual friction, caused by the difference of expansion of the metal surfaces and the glass will soon wear away the intervening packing. This continual friction also causes a wearing away of

the surfaces of the metal, and in the case of galvanized sheet iron destroys the galvanized surface, and exposes the iron to the rapid and destructive action of rust.

There are many metal glazing bars in the market, made of zinc and other so-called non-corrosive materials, for which it is claimed that there is sufficient spring to prevent this above-described friction, and while to a certain degree this may be true, in the direction of one bar from another, yet this friction and consequent destruction and displacement is equally as prominent as in some bars without this spring, and in many cases more so, in consequence of the expansion of the bar in the direction of its length.

Another serious difficulty connected with metal glazing is the great loss of heat in the building, caused by the rapid radiation of heat through the metal surfaces exposed to the inner and outer air. No part of the metal frame of a greenhouse, excepting a small portion of the gutter should be exposed to the outer air.

For the glazing of houses having curvilinear roofs, I would advise having the glass bent to fit the curves. This allows the use of lights of glass twenty-four inches long, and insures a much neater and tighter roof than can by produced by using many short lights around the curves, as was done in times gone by. Many think that the curved glass is very liable to breakage during hail-storms, but experience has taught us the reverse, and this is easily explained, as in the bending the glass becomes annealed or toughened.

Painting. We will now consider the painting of greenhouses. This feature should receive close attention, as upon its use or neglect rest in a great measure the durability and weather-proof qualities of the structure. All parts should be well primed before erection, the iron being scraped, or brushed with stiff steel brushes, to remove all scale, sand, or grease, and then coated with a good quality of anti-corrosive paint and pure linseed oil, using as little dryer or turpentine as possible. The wood, which of course we assume to be perfectly dry and clean, should be well saturated with white lead of good quality and pure linseed oil, either by dipping or by careful laying on with the brush.

After erecting and glazing, the whole house, both iron and wood, should receive two more coats of pure linseed oil and good white lead, thinned with a little turpentine, one coat being perfectly dry before the other is laid on. After the expiration of one full year, the entire outside of the roof and glazed portions of the house

should receive one additional coat. It will be found very advantageous, if a small percentage of oxide of zinc is mixed with the white lead used for painting the inside of the houses. This imparts a much brighter whiteness, and prevents the growth of the gray fungi which adhere to interior surfaces painted with the lead only, and which give the inside of the house a dirty and untidy appearance after a short season's use. This mixture is used now very largely in Government work, and also in the greenhouses at the Executive Mansion at Washington, it being there, I believe, that the original experiments were first made, and the good results discovered.

Ventilation. Ventilating conveniences play a very important part in the furnishing of a greenhouse, the usual system being to have a continuous line of sash about three feet deep along one or both sides of the ridge, and also a similar line below the gutter or eaves line, these being operated by some suitable mechanical means; preferably by the well-known worm and wheel apparatus.

Heating. The heating apparatus plays the most important part in the furnishing of a greenhouse. There are three systems of heating in use; namely, first, by means of hot-air flues; second, by means of circulation of steam through coils of pipes; third, by means of a circulation of hot water through coils of pipes. The heating by flues is a very primitive method, but is often resorted to in consequence of its small first cost, but its cost of maintenance is greatly in excess of that of either steam or water heat, and its results leave much to be desired, as the flues will become leaky, and allow dust and gas to escape into the greenhouse, and destroy all but the hardiest stock. Steam heat comes next in the order of merit; it also has the advantage of comparatively low first cost, but also has the disadvantage of being costly of maintenance, both in the matter of fuel, attention, and repairs. This system is largely in use, and finds many advocates. Hot-water heat, while entailing greater first cost, is the system in general favor, being economical in fuel, requiring very little attention, entailing no cost for repairs, and at all times, when there is any fire under the boiler, being positive in its action. Thus far, it must readily be admitted that the hot-water system of heating is the most desirable, but we have yet to consider the effects on plant life. Steam heat, on account of its intensity, has a tendency to dry the atmosphere of the house to the injury of the plants, but this can be easily counteracted, by means of frequent and

liberal syringing, and if the necessary moist condition of the atmosphere is maintained, the effect of hot water and steam heat upon the plants will be equal; therefore, we find the merits of these systems as follows:

In favor of the steam system: Low first cost, being from seventy-five to eighty per cent of that of a similar hot-water plant.

In favor of the hot-water system: Economy of fuel and ease of management; absence of the necessity for repairs; positive circulation, and consequent radiation of warmth under all conditions of the fires.

The *objections* to each of these systems are; *To the steam system:* Additional fuel consumption, necessity of skilled and continual attention; liability to accidents, leaks, etc., and consequent cost of repairs; total loss of radiation when fires become so low as to allow the temperature of the water to drop below 212°, and consequent loss and damage to stock.

The hot-water system has *one disadvantage* only, namely, higher first cost. I am thus compelled to give the preference to the hot-water system, and will proceed to mention some details which are desirable in its arrangement. Of course, it is understood that the heating of greenhouses must be by a direct system, as no indirect system would give a sufficiently even distribution of the warmth for this purpose.

Two systems of water heating are in use; the first being known as "upward circulation," by which we understand a continual upward grade of the pipes, to a point farthest from the boiler, and a downward grade from that point back to the boiler. The second is known as "drop circulation," where the rise to the highest point is taken directly over the boiler, the pipes then grading downward all the way back. I do not think either of these systems should be given a preference as regards their effect, under ordinary circumstances; but as the "upward" system presents so many less difficulties in the course of construction than the "downward," I would strongly advise its being used in all cases, unless some peculiar conditions of grades or other details of arrangement of the houses exist, which might render the "downward" system advisable.

Benches. In the furnishing of a greenhouse, we must not overlook the benches. If low-cost benches are desired, they may be made of cypress, but for the commercial grower who is interested in future profits and small repair bills, I would advise

an iron bench frame with wooden bottoms, these bottoms being easily replaced at a small cost, without disturbing the main supporting frame. If a permanent bottom is desired, porous tiles may be used, which make a practically indestructible bottom, and one which is very beneficial to the plants, as it admits of a free drainage and circulation of air to the roots. For benches or tables in conservatories for the reception of plants in pots, a slate bottom is desirable, the slate being three-quarters of an inch thick, and planed smooth on both sides. This gives ample strength to support large plants.

I think I have covered the general details in connection with greenhouse construction, as fully as the time will admit, but if there are any especial features which anyone present may wish advice upon, I shall be pleased to give it to the best of my ability.

Discussion.

Kenneth Finlayson spoke of the difficulty of keeping paint from mildewing in greenhouses, especially tropical houses where there is always so much moisture — a condition that seems to favor the rapid growth of the gray fungus. He asked if there were any known preventive or remedy.

Mr. Gibbons advised in preparing the paint to use about twenty to twenty-five per cent of oxide of zinc with seventy-five to eighty per cent of lead. When in Washington some time ago, he visited the conservatory at the White House, and also other structures of the National Government, and was struck by the intense whiteness of the interiors after five to seven years' use. Upon inquiry he was told of this composition, which is found to prevent the growth of the gray fungi referred to, and also the peeling of the paint from the wood.

In reply to another question, Mr. Gibbons said the Hitchings gutters are of thin cast iron; the side next to the greenhouse is exposed to the interior heat, which prevents any freezing on that side, even in zero weather; joints are lapped a little and lined with cement, and all the bolt and screw holes are drilled a little larger than the diameter of the bolts or screws used. By these means all trouble from ice expansion in the gutters is prevented.

As to lapping or butting glass, Mr. Gibbons thought that lapping is always best. In butting glass it is desirable, if not imperative, that the glass should be of uniform thickness, a condition rarely found in either a small or large purchase of glass.

To a question as to best size of glass, Mr. Gibbons answered that, as a rule, the glass should be sixteen by twenty-four inches.

In reply to a question as to the object of grooves in sash-bars, Mr. Gibbons held that the grooves would receive the greater portion of water that was thrown or condensed upon the glass, and convey it to a point over the space between the back of the side benches, and the plate, where the lower side of the groove is cut away, and the water falls directly to the ground. Accumulation of dust in these grooves rarely amounts to an obstruction.

It was asked whether it is better to use four-inch or two-inch pipe for heating a greenhouse, and Mr. Gibbons replied that he prefers four-inch to two-inch pipe, although, other things being equal, the effects of both on plant life are the same. But the four-inch pipe is more reliable, having a larger reserve of heat for an emergency, and will last much longer than any smaller, wrought iron pipe.

Another question was asked as to comparative advantages of the upward and the downward systems of hot-water circulation in greenhouses.

Mr. Gibbons replied that formerly greenhouses were built to accommodate the heating system; but, as in these days we have often to accommodate the heating system to the greenhouses, he thought that under ordinary circumstances the system best adapted to the location, grade, and arrangement of the greenhouse would perhaps serve the purpose better than the other. But where the range to be heated includes more than one house, the drop circulation is difficult to manage; therefore, as stated in the paper read today, taking all things into account, he would strongly advise the upward circulation system in all cases except where the local conditions are such as to render the downward system necessary.

A question being asked as to comparative advantages of tiles or slate for the bottoms or floors of plant benches or stages, Mr. Gibbons said that tiles are in great favor for bench bottoms; they are much superior to slate when the bench is filled with soil in which plants are set, but, for plants in pots slate bottoms are preferable. The advantage of tiles lies in the fact that when they are made, a quantity of coarse sawdust is mixed with the sand and clay, and when they are fired the sawdust is burned out, leaving the tile very porous, thus securing perfect drainage and ventilation.

MEETING FOR LECTURE AND DISCUSSION.

SATURDAY, February 16, 1895.

A Meeting for Lecture and Discussion was holden today at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair. The following paper was read by the author:

ECONOMIC ENTOMOLOGY IN RELATION TO TREES, SHRUBS, AND PLANTS, IN PARKS AND PRIVATE GROUNDS.

By EDMUND B. SOUTHWICK, Ph. D., Entomologist of the Central and City Parks of New York, N. Y.

I am here today to give some hints as to the needs in the care of trees, shrubs, and plants in parks and private grounds, and also to suggest such remedies as I have found of especial benefit in the care of vegetation in the Parks of the City of New York.

An experience of over twelve years has given me an opportunity to become acquainted with these needs, and also enables me to give some advice as to the proper care from an entomological standpoint.

Today I am addressing an intelligent body of horticulturists, who know a tree when they see it and also its family history and the fruits thereof; and you will agree with me, that ignorance of the subject is the greatest drawback to a proper appreciation of it, and therefore to a proper carrying out of the work in "Economic Entomology."

Happily, however, the times are ripening for a wider appreciation and better work—not so much, I fear, from the extra education as from the necessity of combatting insect foes which are becoming so destructive on every side—and men who own fine trees and shrubs are forced to admit that there is an importance attached to Economic Entomology, and that they must consult an entomologist just as they must consult a physician or a lawyer in necessary cases.

The people, however, are not educated up to the point of consulting the physician in this case, and even when the destruction is inevitable and they seek advice, they often will not take the trouble to prosecute the work.

Dr. Thaddeus William Harris, your renowned fellow townsman, was one of the first in the field to begin this education, and as far

back as 1831 he published a list of the insects of your State. The importance of his researches was so appreciated that he was appointed one of a commission for a more thorough survey of the geology and botany of your State, entomology, however, being still an outside issue, and only developed because of his knowledge of its great importance to future generations in the care of vegetable productions so essential to the life of man. Entomologists who see the possibility of increase so enormously displayed in insect life, are specially educated as to what will become of vegetation, if steps are not taken successfully to combat the hosts increasing both in variety and numbers.

As pleasant as it is for me to congratulate you upon the successful work already accomplished in your State, it is my more important duty to remind you that our knowledge of the work of keeping insects in subjection, is still but in its infancy, and we must not only be willing to work in lines that now look to us fairly successful, but must deliberately look for deficiencies, and study to devise more effective means to meet all these needs. Of the hundreds of letters I have to answer during the year, I have yet to receive one in reply, saying the advice was thankfully received and the work would be undertaken.

In one of our prominent Hudson River cities, the elm trees were being defoliated by the elm beetle last season, and one of the prominent citizens came to me in seemingly great distress and wanted to know what we were doing to keep our trees looking so well. After advising him and showing him our machines at work, he said he would at once have the work started and carried on. That was the last I heard of him until this winter, when another citizen of the same place called to see me — filled with still greater distress, if that were possible — and wanted to know what to do with the trees in order to preserve the foliage for the coming summer. He thought they were dying, and something must be done. I mentioned the fact that his fellow townsman had, I supposed, been destroying the insects during the past summer. "Yes," he replied, "That gentleman told us he had seen you, but did not think the work practicable." The truth was, it was too much trouble, after consulting the physician, to apply the remedy, and as soon as he found that it was not altogether slight-of-hand work, but real drudgery, he put it out of his mind and soon set aside the heavy responsibility. And this is but one

example of the use that is made of advice freely and gratuitously given. Nine times out of ten nothing ever comes of it.

I must speak of another foe which deeply concerns trees, and that is *Fungi*. They not only destroy the foliage but break up the tree trunks themselves. Another practice I must also condemn is the wholesale cutting back of trees and shrubs by "tree butchers," who are so numerous in these days. As we ride about in the cars through our cities and towns, we see on every hand where these tree-vandals, have been at work, destroying thousands of fine trees, — actually beheading them. Again, we see the same men, cutting off great numbers of large limbs for no apparent reason, and leaving their large stumps or scars exposed to the action of the elements, insects, and fungi.

No study is ever given to the character of a tree, and elm, maple, and willow alike receive the same treatment. Our trees are too valuable to be destroyed in this way, and the time is at hand — at least with us in New York — when imported insects will do too much of this kind of vandal work, and we are already only too desirous to preserve a bud which will at some time develop into a branch to fill a vacancy that injures the symmetry of the tree and is an unsightly deformity in the eyes of the owner.

In the large city parks of New York, comprising over four thousand acres, there is a great diversity of foliage and tree growth, and therefore a great variety of parasitic life, both animal and vegetable. Like your own city of Boston, New York is a great importing centre, and new things are there being constantly introduced into our country. We are now suffering from some of these introductions, among which the Elm Leaf Beetle (*Galeruca xanthomelæna*) and the Wood Leopard Moth (*Zeuzera pyrina*) can be mentioned.

From a horticulturist's point of view, most of you know how to combat enemies of fruit trees, but perhaps not all who may read this are as wise in their generation, or even willing, like yourselves, to give the time and attention to these details that are so essential to success. I will, therefore, attempt to describe some of the most conspicuous enemies of our shade and ornamental trees, and also the most effective means of combatting them successfully. One of the most serious pests of the many that have been introduced into this country is the Wood Leopard

Moth, not forgetting your own troubles with the Gipsy Moth which you are so heroically fighting, under so able a general as Professor C. H. Fernald, and the great lesson you are learning of the necessity of the same concerted action in this as would be demanded in case of a terrible epidemic scourge.

The Wood Leopard Moth was probably introduced here about twelve or fifteen years ago, and since then it has grown in strength of numbers though not in public favor. The glamour of rare specimens of the moth in entomological collections, has passed its incipient stage, and we are actually in the midst of a fearful warfare. The enemy has already worsted us in many sections around the city, and I am sorry I cannot say that we are able to impede its progress, or that we have hope that it may be stamped out. I cannot say how soon you also will have to take up arms against this destructive foe, for I must confess to you that it is marching on, despite the efforts we in New York City are putting forth, and must eventually reach your vegetation also. It has already spread into parts of New Jersey and Long Island, and is steadily marching northward. This moth has already appropriated as congenial food, over one hundred species of trees and shrubs, and so far the evergreens or conifers seem to be the only ones exempt. The larva of this moth is able to amputate tree-trunks that are six or seven inches in diameter, by cutting a burrow around the trunk, which so weakens it that a strong wind is sure to break it off. Our elms and maples seem to be their favorite food, and thus far have suffered most. Our treatment for the destruction of this insect is to collect all affected limbs and destroy the larvæ we find in them. All limbs that are broken are taken down and destroyed by fire after we have removed and killed all the larvæ we can find. All the smaller trees of the parks are examined carefully, and when a burrow is found bisulphuret of carbon is injected into it and the burrow closed with putty or soap. We often find as many as a dozen or more borers, in the trunk and branches of a small elm or maple from four to six inches in diameter, and these are easily treated with the bisulphuret of carbon, which is sure death to any living thing in the burrow. I have also found it a most effectual remedy for the Apple Tree Borer, and all borers of fruit trees where the burrows can be found; they are often very prominently marked by the frass these borers eject from their burrows. Take a common oil

can with a spring bottom and the liquid can be forced from it, into the burrows without difficulty. I have used bisulphuret of carbon in various forms for insect destruction since 1885. It is most valuable in washes for scale insects also. Injecting bisulphuret of carbon into the burrows of insects is, I consider, one of the most important discoveries I have made for the destruction of wood-boring larvæ. In 1893 we spent three months collecting and destroying the larvæ of this insect, and last year showed the valuable effect of this thorough work in the decreased number working upon our trees.

The next most troublesome species of insects to us is the Tussock Moth (*Orgyia leucostigma*). I see that you have the same species abundant in your own city. For their destruction I have resorted to four methods. First, by hand-picking and by removing the cocoons with wire brushes. In this way barrels of the egg-masses are collected and then destroyed. Second, by jarring the larvæ down with a pole so arranged that a blow from a mallet on a projection at the larger end of the pole, will jar down any that may be on that limb, for they are easily dislodged by the concussion. Third, by poisoning the foliage with London purple, which is quite effective, especially on trees that have not been properly cleared from egg-masses during the winter. Fourth, by spraying the trunks of large trees that are covered with cocoons, with an emulsion of petroleum and crude carbolic acid. This emulsion, put on with a stiff spray, will penetrate most of the cocoons and destroy the pupæ or larvæ within, and many of the eggs that have been deposited on the outside of the cocoons. This last method is only resorted to, when from want of proper winter cleaning, the trees have been defoliated by these insects.

For the Elm Beetle (*Galeruca xanthomalæna*) we try to follow up preventive measures by spraying the trees with London purple, as soon as we find the first groups of eggs. This is usually from May 28 to June 6. This spraying is kept up at intervals of two or three weeks, until autumn. Another method which we are faithfully following is to kill all the pupæ we can find at the base of the tree or along walls and in any out of the way places. This, I think, is of the greatest importance, and all pupæ should be destroyed as fast as they show themselves. An emulsion of petroleum and carbolic acid is used, and this is sprayed into and over all places where the larvæ have crawled to pupate.

The Bag Worm (*Thyridopteryx ephemeræformis*) was at one time very destructive to our park trees, and is still, I am told, in some sections of the country. These can be readily removed with tools in the winter season, and the trees can also be sprayed for their destruction when in foliage. For Tent Caterpillars and others that feed in masses, as Vanessa, Datana, etc., the most effectual method is to remove the mass as soon as they are discovered. If they are very young, a single twig or even a leaf, will be all that it is necessary to take off; but if left till nearly full grown, they can be taken out by hand, or if on an unimportant branch, this may be cut away with the attached mass.

For scale insects, many of the emulsions so well known can be applied, and if a pliable steel brush is used in addition, the work can be made very complete, save on the smaller twigs, which can be sprayed with the emulsion as the best means of reaching the insects without destroying the smaller branches.

For Plant Lice (Aphides) one of the most effectual means is to break up the colonies with a stiff spray of water, for most of them have a gummy secretion that prevents the emulsion from acting upon them, but let the hose be played upon them for a moment, and they are in condition to receive the destructive agent.

For the Pine Chermes (*Chermes pinicorticis*) and the Maple Pulvinaria (*Pulvinaria innumerabilis*), I have for a long time been using the spray, and it is the most effectual means of cleaning a tree of these pests. With this spray one can knock down quantities of larvæ from the branches, and most effectual work could be done with a steam engine with the proper hose attachments in killing great quantities of insects besides keeping many of them in subjection. I would condemn the practice of boring holes into trees, with the idea that the preparation inserted is going to spread over the whole tree and thereby destroy all kinds of insects; that is a physical impossibility. We who have charge of plantations of trees are constantly beset by venders of remedies of all kinds that will kill everything but the trees. My advice is, do not waste time and money trying everything that is offered, but consult a physician who is making this a life work — and you have a number of the very best of these in your own state — and his conservative opinion, born of hard practical experience, will be the best advice to follow.

In treating our trees, shrubs, and plants for the destruction of insect foes, I would advise careful and persistent winter work, for when the trees are leafless is the best time to remove all cocoons, egg-masses, etc., from the limbs and trunks, and every dead leaf or bunch of leaves that is fastened to the limbs ought to be considered as harboring a mass of eggs or a pupa, and even if it does not it is safer to have it out of the way. Always make your winter work thorough and your summer trouble will be less. These preventive measures are always to be studied and practised. As you watch the expanding foliage, flowers, and fruits of your trees, watch also for their enemies. Learn to distinguish between friend and foe so as to be able to preserve the one and destroy the other.

Discussion.

Professor Southwick displayed numerous charts, two by three feet in size, some having magnified figures of the noxious insects and fungi referred to in his paper, showing them at their different stages of development, that those present might be able to recognize the living specimens at sight.

Other charts showed various tools and the method of using them in the warfare against the many insect pests infesting the trees, shrubs, and plants in the several parks in the city of New York.

There was also quite an array of the smaller tools, among which were brushes of various forms and sizes, the brush material being steel wire of different degrees of firmness and elasticity. Some were suitable for brushing cocoons and egg-masses from the trunks and branches of rough-barked trees, while others were used on those with smooth, tender bark.

There were knives of different sizes and forms, of which the shoe knife was held to be the most useful; also gouges, chisels, mallets, saws of different styles, metal cans with spring bottoms, used to inject bisulphide of carbon into the burrows of wood-boring insects in trees and shrubs, and a variety of other implements for special purposes.

As Professor Southwick found nothing in the markets to serve his requirements, he invented apparatus to meet his need in particular lines of work.

This collection of charts excited considerable interest, and at the conclusion of the lecture, many of the audience came to the

platform to examine them more carefully. This led to conversation rather than discussion, but from which the following information was gleaned:

Twelve years ago when Professor Southwick assumed charge of the entomological work in the parks of New York City, large numbers of trees were defoliated by the Bag Worm (*Thyridopteryx ephemeræformis*). The trees looked as if a fire had swept through them, so completely were their leaves eaten by this insect. With his improved tools, made for this work, he collected nearly twenty-two bushels of these insects in one season and destroyed them. This method of dealing with them nearly extirpated the species and it has since been easy to keep them in subjection. This was done when the trees were leafless, and the insects' cases were easily seen. The Elm Leaf Beetle (*Galeruca xanthomelæna*) works on the leaves of the elm tree, the beetles eating round holes in the leaves and the larvæ consuming every vestige of the parenchyma. Professor Southwick said that in May and June he constantly watched the elm trees in the parks, and as soon as he saw the beetles or larvæ at work he immediately sprayed the parts affected, but did not attempt to spray the whole tree at that time. From the middle of May to October the trees were sprayed several times. The solution used was: London purple, one pound; flour, four or five quarts; lime, three pounds; and water, one hundred gallons. The flour is added to make the poison adhere to the foliage. The solution is sprayed on the under side of the leaves as much as possible, from a fine cyclone nozzle. This solution is carried from the force pump to the nozzle, through a quarter-inch orifice, rubber canvas insertion hose. The canvas makes the hose strong and light, so that when it is lashed to a light bamboo pole, the operator can hold up fifty or more feet of it without difficulty. Professor Southwick urged that the larvæ of the Elm Beetle should be destroyed when they come down the trunks of the trees to pupate at its base, as this would materially lessen the number of beetles for the next generation. In the case of large trees, the men climb into them, but if they are not over fifty feet in height, an extension pole is used to raise or lower the spray as is needed. These poles are fastened to each other with bands and are hoisted up and let down with a rope and pulley. The preparation used for destroying the larvæ and pupæ at the base of the tree is: Soap, six pounds; kerosene,

five quarts; carbolic acid, two or three quarts; and water, one gallon. This is boiled together and afterward mixed with one hundred gallons of water.

The Wood Leopard Moth (*Zeuzera pyrina*) was first noticed by him in the New York Parks in 1884, when the gardeners brought him a larva which they had taken from an elm limb. The female of this insect probably inserts an egg at the base of a leaf or node of the twig, and the young larvæ enter the twigs at that point. As it increases in size, it bores to the lower part of the branch, or leaves it and migrates to another branch or to the trunk. From a small maple three and one-half inches in diameter, Professor Southwick said he had taken thirty-two borers of this destructive insect, and that in the city parks they had already been found in over one hundred species of trees and shrubs. The remedy is to destroy all branches that are affected or broken off, as far as possible, and to inject bisulphide of carbon into their burrows, and putty up the hole. Their burrows can be easily found, as the borer throws out the frass and this can be seen at the base of the tree or on the trunk and limbs. Professor Southwick said, the great secret of success with spraying compounds and insect subjection is in preventive measures; that is, treating the affected plants before the insects have spread over the entire foliage, and following it up by repeated applications as the cases in hand required.

The Rose-chafer or Rose-bug (*Macrodactylus subspinosus*) is described by Dr. T. W. Harris, in his work on "Insects Injurious to Vegetation," as "one of the greatest scourges with which our gardens and nurseries have been afflicted." As it breeds below the surface of the earth, we have to deal with it only in its beetle form, and during a period of about forty days from the second week in June, each year. The most reliable methods of treating them are, first, by hand-picking into a dish containing kerosene, and, second, by jarring the tree, shrub, or vine upon which they are feeding; this frightens them and they instantly let go their hold on the plant and drop to the ground; but we can catch the falling insects upon cotton sheets (previously arranged under the plant like an inverted umbrella) and then kill them in kerosene. This should be done in the earlier hours of the morning when the beetles are less active, as during the warmer part of the day they will be quicker on the wing and escape.

Professor Southwick, in reply to a question, stated that they had no Gipsy Moths (*Ocneria dispar*) in New York City or vicinity.

A species of Sap-fly, supposed to be a Sciaria, has proved quite mischievous among the park trees of New York City. If a limb is cut off, it often happens that the scar is induced to bleed by the white worm-like larvæ of this dipterous insect, which are able to keep up the flow until cold weather. This sap, which becomes sour and of the consistency of thin jelly, runs down the trunks, rendering them very unsightly, and no doubt the trees are weakened by its continuous loss. These spots are conspicuous on several species of trees but the elm is the more often affected, and the wood, thus softened and exposed to the action of the atmosphere and to the spores of fungi, soon becomes a rotten spot in the tree unless the progress of decay is arrested. The remedy has been to spray the spots with a carbolic acid solution; then, when nearly dry, to brush the scar clean with a rice-root brush, dry off with plaster of Paris and apply paint or shellac (or liquid celluloid if the tree is a valuable one), after which there will be no more trouble. Incidentally, reference was made to fungous disorders or pests, and Professor Southwick remarked that there were a great many species working on the trees and shrubs, and that *Agaricus ulmarius* was conspicuously destructive; that a well-developed bunch of it was found upon a scar from which a limb has been removed only two weeks before. He added that the mycelium of the fungus penetrated the wood a long distance and soon destroyed its structure.

Being questioned as to the possibly fatal effect upon poultry from eating apples that have been sprayed with the London purple solution, Professor Southwick said that as the solution contained as much lime and as much flour as of the London purple, and should be put on in a spray as fine as mist, he doubted whether any harm would come to any poultry from the quantity of the fruit they would eat.

MEETING FOR LECTURE AND DISCUSSION.

SATURDAY, February 23, 1895.

A Meeting for Lecture and Discussion was holden today at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair.

The following paper was read by the author:

EXPERIMENTAL EVOLUTION AMONGST PLANTS.

By Professor L. H. BAILEY, Cornell University, Ithaca, N. Y.

[Before entering upon the proper subject of the hour, the speaker made some introductory remarks concerning the present state of belief in the theory of evolution. A brief abstract of these remarks is here given.]

Every thoughtful person at the present day is an evolutionist, although he may not know it. Everyone now considers every movement, either of human society or of natural forces, in connection with its origin and gradual growth or development. A person may be an evolutionist without subscribing to any particular doctrine of the origin of species or to any particular dogma either of religion or science. Evolution in the abstract means merely a gradual unfolding or growth. In the organic world, the term is used to designate the belief in the origin of one form or one species from another. Its use does not necessarily imply that one believes in the origin of all things from one species or from many. It simply means that a person sees growth, development, and progression in nature.

There are two chief reasons for the belief in the evolution of animals and plants: first, the fact of struggle for existence; second, the fact that there are constantly recurring physical changes. The struggle for existence is the necessary result of the multiplication of species, and the physical changes necessitate a constant modification of the species in order that they may fit themselves into the environment.

There are five chief lines of proof of evolution: first, the record of the rocks, or palæontology; second, the fact that animals and plants are widely variable,—so much so that no two individuals in the world are exactly alike; third, we can see adaptive changes taking place, particularly among plants which are widely disseminated by man or which are brought under domestication; fourth,

the presence of missing links or breaks in the chain of life, which shows that those forms which are weakest, or least adapted to live, have dropped out and have left the others to strengthen themselves; and, fifth, the fact that there is a perfect adaptation of all organisms to their environments or conditions of life.

The doctrine of evolution is old, although it was not until the opening of the present century that it began to take on specific and technical form. It was taught more or less vaguely by the Greeks, and, later, by the Arabs. Perhaps it may be said that two chief epochs in the history of the unfolding of the doctrine are those represented by Copernicus and Darwin. Copernicus disproved the old geocentric doctrine, or the notion that the earth is the center of the universe; Darwin disproved the homocentric doctrine, or the notion that man is the central object of nature. We now conceive of the universe as a whole, undergoing a general progressive or onward movement in which all its parts are intimately concerned.

After these introductory remarks, Professor Bailey delivered his lecture as follows:

De Varigny has written a most suggestive book upon Experimental Evolution, in which he contends for the establishment of an institution where experiments can be definitely undertaken for the purpose of transforming a species into a new species. "In experimental transformism," he writes, "lies the only test which we can apply to the evolutionary theory. We must use all the methods we are acquainted with, and also those, yet unknown, which cannot fail to disclose themselves when we begin a thorough investigation of the matter, and do our utmost to bring about the transmutation of any species. We do not specially desire to transform any one species into another known at present; we wish to transform it into a new species. * * * Experimental transformism is what we need now, and therein lies the only method we can use."

This is a most commendable object, and I hope that the attempt will be made to create a new species before our very eyes. This is what most people demand, as a proof of evolution, and they are sometimes impatient that it has not been done; and it would seem, upon the face of it, that nothing more could be desired. When I reflect, however, upon the fact that this very thing has occurred time and again with the horticulturist, and then

consider that botanists and philosophers persist in refusing to see it, I am constrained to offer some suggestions upon De Varigny's excellent ambition. If I show a botanist a horticultural type of recent or even contemporaneous origin which I consider to be specifically distinct from its ancestors, he at once exclaims that it is not a species but a horticultural variety. If I ask him why, he replies, "Because it is an artificial production!" If I show him that the type is just as distinct from the species from which it sprung as that species is from its related species and that it reproduces its kind with just as much certainity, he still replies that, because it is a horticultural production, it cannot be a species. In what, then, does an accidental horticultural origin differ from any other origin? Simply in the fact that one takes place under the eye of man and the other occurs somewhere else! It is impossible at the present day to make a definition of a species which shall exclude many horticultural types, unless an arbitrary exception is made of them. The old definitions assumed that species are special creative acts, and the method of origin is therefore stated or implied in all of them. The definition itself, therefore, was essentially a statement of the impossibility of evolution. We have now revised our definitions so as to exclude the matter of origin, and thereby to allow free course to evolution studies; and yet here is a great class of natural objects which are practically eliminated from our consideration because, unhappily, we know whence they came! Or, to state the case differently, these types cannot be accepted as proofs of the transformation of species because we know certainly that they are the result of transformation!

Now, just this state of things would be sure to occur if De Varigny were to transform one species into another. People would say that the new form is not really a species, because it is the result of cultivation, domestication, and definite breeding by man. He could never hope to secure more remarkable transformations than have occurred a thousand times in the garden; and his scheme — so far as it applies to plants — is essentially that followed by all good gardeners. Or, if the prejudices of scientists respecting the so-called artificial production of species could be overcome, he could just as well draw his proofs of evolution from what has already been done with cultivated plants and domesticated animals as from similar results which might arise in the future from his independent efforts. I am not arguing

against the scheme to create a species before our eyes, but I am simply stating what has been and is the insurmountable difficulty in just this line of endeavor,— the inability of the experimenter to satisfy the scientific world that he has really produced a species; for it is a singular thing that whilst all biologists now agree in defining a species upon its tangible and present characters, they nevertheless act, for the most part, upon the old notion that a species must have its origin somewhere beyond the domain of exact history.

This notion that a species, to be a species, must have originated in nature's garden and not in man's, has been left over to us from the last generation,— it is the inheritance of an acquired character. John Ray, towards the close of the seventeenth century, appears to have been the first to use the word species in its technical natural-history sense, and the matter of origin was an important factor in his conception of what a species is. Linnæus's phrase is familiar: "We reckon as many species as there were forms created in the beginning." Darwin elaborated the new conception,— that a species is simply a congregation of individuals which are more like each other than they are like any other congregation, and with a freedom from prejudice which is rarely attained even by his most devoted adherents, he declared that "one new variety raised by man will be a more important and interesting subject for study, than one more species added to the infinitude of already recorded species." The old naturalists threw the origin of the species back beyond known causes; Darwin endeavored to discover the "Origin of Species," and it is significant that he set out without giving any definition of what a species is. I have said this much for the purpose of showing that it is important, when we demand that a new species be created as a proof of evolution, that we are ourselves open to conviction that the thing can be done.

I have said that no modern naturalist would define a species in such terms that some horticultural types could be excluded, even if he desired that they should be omitted. Haeckel's excellent definition admits many of them. In his view, the word species "serves as the common designation of all individual animals or plants, which are equal in all essential matters of form, and are only distinguished by quite subordinate characters." It is impossible, however, actually to determine whether one has a species in

hand by applying a definition. One must show that his new type — if it is a plant — has botanical characters as well marked as similar accepted species have, and these characters must show, as a whole, a general tendency towards permanency when the plant is normally propagated by seeds. He must measure his type by the rule of accepted botanical practice. If the same plant were found wild, so that all prejudice might be removed, would the botanist unhesitatingly describe it as a new species? If yes, then we should say that a new species had been created under the hand of man; and this rule I wish now to apply to a very few familiar plants. In doing so, I do not wish to be understood as saying that I consider it advisable to describe these plants as species under the existing methods of botanical description and nomenclature, for, merely as a matter of convenience and perspicuity, I do not; but I wish to show that they really are, in every essential character, just as much species as very many other universally accepted species are.

The evolution of forms which any botanist would at once designate as species, were he ignorant of their origin, is well illustrated in the tomato. Dunal, the accepted authority upon the genus Lycopersicum, admits ten unqualified species into his account in De Candolle's Prodromus. Two of these, *L. pyriforme* and *L. cerasiforme*, are generally regarded as mere forms of the common garden species, *L. esculentum*, both because they are very like the common tomato in botanical characters and because we know, as a matter of history and experiment, that all three of these reputed species are modifications of one type. Omitting these two species, then, there remain eight to which we cannot attach any such suspicion as a knowledge of their origin. These are what botanists call good species. These species agree in having a weak and spreading habit of growth, much like the common tomato. The features by which they differ amongst themselves, that is, the specific characters, are founded chiefly upon the manner of division of the leaves, the shape of the leaflets, the character of the flower cluster, and the relative hairiness or smoothness of the parts. If one applies these same tests in the same degree, to the two modern offshoots of the tomato — the Upright and the Mikado types — he will find that these offshoots differ as much or even more from each other and from their own common parent, than any one of the wild species differs from any

other species; and everyone knows that these characters come true from seed. The Upright type differs from all other tomatoes in its stiff and self-sustaining habit of growth, a character which belongs to Solanum rather than to Lycopersicum; and this habit is so marked that persons unfamiliar with the variety usually think the plants potatoes rather than tomatoes, when the fruit is not seen. The entire foliage of the plant is so distinct that the most casual botanist could draw botanical characters from it to separate the plant specifically from any other species of Lycopersicum which is yet described. The leaflets are reduced in number and are greatly modified in shape. Even the inflorescence shares in the transformation, for the flowers, instead of being six or more as they are in its known ancestors, are reduced to two or three. If De Varigny were to experiment for centuries, he could scarcely expect to produce any "new species" which should have better characters than this singular race of tomatoes, the origin of which is so well known that we have the record of the year in which it originated, and the very man who sowed the seed from which it sprung. This curious race came in suddenly, without any premonition, so far as we know, of its appearing, and the same thing has probably not originated a second time.

The other type to which I referred, the large-leaved or Mikado race, gave evidence of its coming. This type has a most remarkable divergence from the species in the most fundamental botanical characters of its leaves. The leaflets are much fewer than in the common tomatoes, very large, the lower side strongly decurrent on the stem, the margins entire, and the blades plane or flat,—characters which are as far removed from *Lycopersicum esculentum*, from which it came, as the characters of the latter are from other recognized species. In young plants, the leaves are even entire, a character which is supposed to be foreign to the genus. The tendency towards this large-leaved type was noticed many years ago in the old Keyes's Prolific tomato, but it appeared to have first attracted much attention in Nisbit's Victoria, a variety which came from seed of Hathaway's Excelsior, which has foliage very small, curled, and much divided. In very recent years, it has appeared again in a most emphatic form in the Mikado or Turner Hybrid, and in the Potato Leaf. We have a good indication of how distinct these two races of tomatoes are from the fact that we have a real species — that is, one which has no genealogy — in

cultivation, besides *Lycopersicum esculentum*, and it is not regarded by horticulturists as worthy such explicit description or separation from the common type of tomatoes as either the Upright or the Mikado type is. In fact, gardeners do not look upon it as a distinct species at all, although it is universally received by botanists, and Vilmorin even places it in the genus Solanum. This is the Currant tomato, or *L. pimpinellifolium*.

But the most remarkable feature of the evolution of the tomato, to my mind, is one which appears to have escaped scientific comment. It is the fact that, in America at least, the whole body of garden forms is rapidly progressing or departing from the original type. This original type, or something very like it, was the only tomato at the opening of the century, and it was essentially that which the older men of the present generation knew in their boyhood. The plant was comparatively small, with an erect or upright tendency of the young shoots, with foliage light in color and small and either thin or much curled, the leaflets tending somewhat to rounded forms, the flowers two-ranked in long and sometimes forking clusters, the fruit, in the simplest forms, strictly two-celled, and in the most developed forms flat on the top and bottom and corrugated or ridged on the sides. Now all this is changed, and there is only an occasional variety, or the persistent Cherry Tomato, which recalls the old type. At present, the tomato plant is large and widely spreading, with scarcely an indication of the spire-like growths of the young shoots which characterized the old forms, with foliage very dark green and large and the leaflets thick and flat and tending to pointed and jagged forms, the flowers reduced to irregular clusters of two to four, the fruit very many-celled, and, under the influence of recent selection, regularly rounded on top and apple-shaped. For nearly a century, the tomato has been steadily moving forward into this new form, with all its botanical characters profoundly modified; and it holds this form as uniformly when propagated from seeds as any wild species could be expected to do. If, as Haeckel declares, a species is a succession of organisms which exhibit the same form under the same environments, then even the common type of tomatoes might contend for specific distinction from their ancestors of a century ago. At all events, we have here as profound, onward, definite, transformation as De Varigny could hope to secure in the same length of time; and if

such productions as these of which I have spoken are not to be accepted as species, why should we accept those which we assume would arise under the care of an evolution experiment station? Here we have absolutely new and unique types, as De Varigny demands, and they are as distinct from each other and from their parents, in accepted botanical characters, as "good species" in the same genus are from each other, and they perpetuate these characters as unequivocally as those species do. Moreover, we know definitely what their origins were, and they therefore answer all the purposes of experimental evolution.

Similar observations respecting the evolution of forms of specific importance, could be made for most species of plants which have been widely cultivated for a considerable length of time. The case is singularly well illustrated in Indian corn. Maize has been very uniformly accepted as a single species by botanists. This arises mostly from the fact that corn is nowhere known truly wild, and has therefore attracted little attention from systematic botanists. There are some authors, however, who have made species of some of the marked cultivated types, either upon the hypothesis that these forms must have been derived from distinct wild types, or that, independently of origin, they merit specific recognition. The chief author who takes the latter view is Sturtevant, who, whilst accepting the common origin of all types of maize, nevertheless prefers to recognize seven "agricultural species," as follows: *Zea tunicata*, "a primitive form" from which the other six are derived,—*Zea everta*, pop corns; *Z. indurata*, flint corns; *Z. indentata*, dent corns; *Z. amylacea*, soft corns; *Z. saccharata*, sweet corns; and *Z. amyleasaccharata*, the starchy-sweet corns. Whilst these species are not accepted by the regular botanists, there can be no doubt that some of them would be regarded as distinct species if they should turn up in an evidently wild state; and a proof of this statement is found in Watson's *Zea canina*, which was founded upon wild corn collected in southern Mexico. Now Mr. Watson was one of our most conservative American botanists, and any new species which he should describe could be depended upon to have good botanical characters; yet this new *Zea canina* is so like our rice pop corns that Sturtevant unhesitatingly refers it to his *Zea everta*, thus showing that it is not more unlike ordinary corn than some types of pop corn are! Moreover, this corn is found to lose quickly

the very botanical characters upon which the species is founded, when it is brought into cultivation. Even in its wild state it is scarcely more distinct from the common races of maize than the "husk corn" is, or the curious striped-leaved corn of Japan,—and the latter would certainly be considered worthy of specific recognition by botanists were it not for the fact that historical evidence shows that maize was introduced into Japan directly or indirectly from the New World, and that, therefore, its origin is more or less enshrouded in knowledge! All this is but another illustration of how tenaciously botanists still hold to the Linnæan idea of species, whilst they profess the Darwinian idea.

A similar evolution of types which are as distinct and permanent as accepted species in the same genus, is well illustrated in the various beans. The common garden or kidney bean was made into two species by Linnæus, the pole beans (*Phaseolus vulgaris*) and the bush beans (*P. nanus*). Since it has been demonstrated by experience and experiment, that these groups are interchangeable forms of one type, botanists have discarded Linnæus's designations of them and now call the garden bean a single species; yet it should be said that a more explicit and satisfactory instance of the evolution of specific forms right under our own observation could not be demanded. The two groups are species until we discover that they have sprung from one type within historic times, whereupon we then regard them not as species but as anomalies of cultivation. Von Martens, however, discards origin as a mark of specific likeness or difference, and now proposes to erect seven species upon the obvious racial differences in the garden beans. But the most interesting feature of this bean botany is the complete neglect, on the part of botanists, of the singular dwarf Limas, which have appeared in very recent years. Remember, now, that Linnæus regarded the common pole beans and the common bush beans as two distinct species, because one is a running or twining plant and the other is a dwarf erect plant. The Lima bean is a twining plant; but within the last few years three well-marked types of true bush beans have sprung independently from the old types of Lima. If these differences were worth specific recognition in the common garden beans, why are not the same differences worth at least a passing comment in the Lima bean? Yet, because these types have originated before our eyes, botanists consider them not worth

notice, although, at the same moment, they are hoping for the time when they shall see the origination of a new species of plant! But this curious bean evolution has not stopped here. The old Scarlet Runner and White Dutch Runner of our gardens (*Phaseolus multiflorus*) have well marked botanical characters in the leaves, inflorescence, pods, beans, and particularly in the roots, which are fleshy and perennial, and in the very tall twining habit. Yet, at the moment when dwarf forms had sprung off the Lima stock — in the same way as the common bush beans undoubtedly had sprung off the stock of the common pole bean before Linnæus's time — a bush bean sprung off the stock of the old White Dutch Runner, and this is known in commerce as Barteldes's Bush Lima. But this singular bean has other characters than the very dwarf complete bush habit, to distinguish it from its parent, for it differs in a smaller inflorescence, in foliage, and particularly in a remarkable tendency towards a fibrous annual root. Here is a new form which surely ought to satisfy any person who demands the direct origination of a new species, as a proof of evolution.

There are other curiosities amongst the beans. Gardeners know two well-marked types or races of the Lima bean, the Sieva type and the Large Lima type. There are good and valid botanical distinctions between the two, which were amply recognized by Linnæus, who, supposing that one came from Bengal and the other from Africa, made species of them. The smaller, or what we now know as the Sieva type, he called *Phaseolus lunatus;* the other he called *P. inamœnus.* The term Lima bean, which all agree in associating with *Phaseolus lunatus*, should properly be applied, therefore, to the Sieva type. For a century these species of Linnæus were generally considered to be good,— that is, distinct and valid. It is now pretty well established that both these beans came from Brazil. Only one of them is known in a truly wild state, and the suspicion is so strong, therefore, that the other sprung off from it under cultivation, that the two types are now united as one species. Still a third well-marked type, differing in shape and texture of leaflets, and characters of pods and seeds, has now originated from the Large Lima type; this is the Potato Lima type. It should also be said that Macfadyen, in his flora of Jamaica, made four new species out of the Lima type of beans. Here, then, are three groups of beans, each

as distinct from the others and from its ancestors as accepted species of Phaseolus are from each other, yet, because of their origin under domestication, they are debarred specific distinction. Now, a most curious thing about these dwarf Lima beans, which have appeared so suddenly in the past few years, is that they have come from each of these three types,— Henderson's from the Sieva type, Thorburn's or Dreer's from the Potato Lima type, and Burpee's from the Large Lima type,— thus showing that each of these types or races is developing along independent but parallel lines; and these lines are also identical with the method of evolution which was early assumed by the common garden bean and with the departure which has just now appeared in the old White Dutch Runner.

The Soy bean, now coming into popular cultivation in the South, affords a most striking example of the evolution of a new species, and one, moreover, which is accepted by careful botanists. This plant is unknown wild, and there is every reason to consider it to be a modified form of the wild *Glycine Soja* of China and Japan; but its botanical characters are so unlike those of its ancestral household that Maximowicz — a most conservative botanist — describes it outright as a new species, *Glycine hispida*.

I have now brought to your attention a few familiar plants for the purpose of showing that what are, to all intents and purposes, good species have originated in recent years; and that, whilst botanists demand that the origination of species within historic times shall constitute the only indisputable proof of organic evolution, they nevertheless refuse to accept as species those forms which have thus originated and which answer every demand of their definitions and practice. The proofs of the evolution of species, drawn from the accepted practice of the best botanists themselves, could be indefinitely extended. We need only recall the botanical confusion in which most cultivated plants now lie, to find abundant proof of the evolution of hundreds of types, so distinct that the best botanists have considered them to be species; but other botanists, basing their estimate of species upon origins, have reduced them or reincluded them into the form or type first described. Consider the number of species which have been made in the genus Citrus, comprising the various oranges, lemons, limes, and the like. Recall the roses. The Moss rose and others would be regarded as distinct species by any botanist

if they were found wild and if they held their characters as tenaciously as they do under cultivation. In fact, the Moss rose was long regarded as a good species, and it was only when its origin began to be understood that this opinion was given up. The earlier botanists, who were less critical about origins than the present botanists are, made species largely upon apparent features of plants, although their fundamental conception of a species was one which was created as we find it, in the beginning. Yet, strangely enough, we at the present day, who profess to regard species as nothing more than loose and conventional aggregations of similar individuals, and which we conceive to have sprung from a common ancestor at some more or less late epoch in the world's history, make our species upon premises which we deny, by giving greater weight to obscurity of origin than we do to similarities of individuals.

The fact is that the practice of systematic or descriptive botany is at variance with the teachings of evolution. Every naturalist now knows that Nature does not set out to make species. She makes a multitude of forms which we, merely for purposes of convenience in classifying our knowledge of them, combine into more or less marked aggregations to which we have given the name species. Very often we find in Nature an aggregation of successive individuals which is so well marked and set off from its associated groups that we consider Nature to have made an out and out distinct species; but a closer acquaintance with such species shows that, in many cases, the intermediate or outlying forms have been lost and that the type which we now know is the remainder in a continuous problem of subtraction. In other cases, a form appears to have arisen without intermediate forms, as a distinct offshoot from an older type. This is well illustrated in many remarkably distinct garden forms, which originated all at once with characters new to the species or even to the genus. I have mentioned such a case in the Upright tomato. Even the sudden appearance of these strange forms is proof that species may originate at any time and that it can be no part of our fundamental conception of a species that it shall have originated in some remote epoch. Species-making forever enforces the idea of the distinctness and immutability of organic forms, but study of organisms themselves forever enforces an opposite conception.

The intermediate and variable forms are perplexities to one who attempts to describe species as so many entities which have distinct and personal attributes. So the garden has always been the bugbear of the botanist. Even our lamented Asa Gray declared that the modern garden roses were "too much mixed by crossing and changed by variation to be subjects of botanical study." He meant to say that the roses are too much modified to allow of species-making. The despair of systematic botanists is the proof of evolution!

I repeat that mere species-making, in the old or conventional sense, is an incubus to the study of nature. One who now describes a species should feel that he is simply describing a variable and plastic group of individuals for mere convenience's sake. He should not attempt to draw the boundary lines hard and fast, nor should he be annoyed if he is obliged to modify his description every year. This loose group may contain some forms which seem to be aberrant to the idea which he has in mind; and it would seem as if he should be ready to call them new or distinct species whenever, from whatever cause, they become so much modified that it is convenient, for purposes of identification and description, to separate them from the general type. Just as soon as botanists come to feel that all so-called species of plants are transitory and artificial groups, maintained for convenience in the study of Nature, they will not ask whether they are modified outside the garden or inside it, but will consider groups of equal distinctness and permanence to be of equal value in the classification of knowledge, wholly aside from the mere place of their origin. At the present time, the garden fence is the only distinction between many accepted species and many disregarded ones. The cultivation of man differs from the methods of nature only in degree, not in kind; and if man secures results sooner than nature does it is only another and indubitable proof of the evolution of organic forms. It is certainly a wholly unscientific attitude to demand that forms originating by one of nature's methods are species, while similar forms originating by another method are beneath notice.

If species are not original entities in nature, then it is useless to quarrel over the origination of them by experiment. All we want to know, as a proof of evolution, is whether plants and animals can become profoundly modified under different conditions, and if these modifications tend to persist. Every man before me

knows, as a matter of common observation and practice, that this is true of plants. He knows that varieties with the most marked features are passing before him like a moving panorama. He knows that nearly every plant which has been long cultivated, has become so profoundly and irrevocably modified that people are disputing as to what wild species it came from. Consider that we cannot certainly identify the original species of the apple, peach, plum, cherry, orange, lemon, wine grape, sweet potato, Indian corn, melon, bean, pumpkin, wheat, chrysanthemum, and nearly or quite a hundred other common cultivated plants. It is immaterial whether they are called species or varieties. They are new forms. Some of them are so distinct that they have been made the types of genera. Here is the experiment to prove that evolution is true, worked out upon a scale and with a definiteness of detail which the boldest experimenter could not hope to attain, were he to live a thousand years. The horticulturist is the only man in the world whose distinct business and profession is evolution. He, of all other men, has the experimental proof that species come and go.

Discussion.

Rev. Calvin Terry said that a minister once announced to his congregation, and advertised in the local papers, that he would preach on evolution. His people expected to hear a scientific discussion of the subject. But the preacher started with a living man in view, and confined his remarks to showing the possibility, the need, and the duty of everyone to strive to become a better man, or a better woman,— every Christian to become a better Christian. The preacher's evolution meant, simply growing in grace. A negro preacher undertook to give an account of the creation of man. He said, in dramatic style: "God wet de clay, and formed de man, and set him up ag'in' de fence to dry." One of the congregation, having more sense than the preacher, interrupted him and said: "But massa, who put dat fence dar?" Some, who call themselves scientific evolutionists maintain that somehow things make themselves, and that all existing organisms have been developed from some very low substance called protoplasm. Ever, in science, common sense requires us to believe that we must have something to begin with. We cannot undertake to say that things have come into being without a Creator,— a self-existing, eternal cause. These philosophers sound the deep

sea and draw up mud, and with microscopic eyes examine it, to find something which has the elements of life. But where did that first thing come from! How came it to possess this element of life, with the power to grow — by a long process, and the survival of the fittest — into a Daniel Webster? Everything must be furnished by Creative power, with those elements to be developed. Whatever our theories, we cannot account for the existing organisms without the Creative act of an Infinite, Almighty, and Eternal power.

F. L. Temple said that scientific botanists claim that a species can maintain itself and has done so from the beginning. On the other hand, varieties, so far as we know, cannot endure in competition with original species, therefore they should not be called species.

Professor Bailey responded that seemingly Mr. Temple had brought up a good point; but it is a mere assumption that a wild form, even though it be termed a species, can and will maintain itself. We know that a wild bitter orange exists in Florida; that two forms of wild apples are known in Europe; yet it is known that the latter are not original species, but varieties which persist, the same as species are assumed to do.

A lady said she understood from Professor Bailey's lecture that he did not distinguish creation from development.

Professor Bailey replied, citing Dawson's belief in successive points of creation; and added that the question of ultimate origin of any created thing has no necessary connection with evolution. Creation and evolution are entirely distinct. "In the beginning, God," is the way creation appears to his mind.

William D. Philbrick moved a vote of thanks to Professor Bailey for his able and instructive lecture, and it was unanimously passed.

BUSINESS MEETING.

SATURDAY, March 2, 1895.

An adjourned meeting of the Society was holden at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair.

Ex-President William H. Spooner, read a circular asking contributions to a Memorial to Francis Parkman, late President o

the Society, to be erected in the garden he created, and by the shores of the lake he loved so well, both now destined to become a part of the Public Park system of his native city. The circular was signed by Martin Brimmer, Leverett Saltonstall, Henry L. Higginson, Charles S. Sargent, and Lorin F. Deland, Committee.

O. B. Hadwen announced the decease of John J. Thomas, of Union Springs, N. Y., an Honorary Member of the Society, and moved the appointment of a committee to prepare a memorial of him. The motion was carried and the Chair appointed as that Committee, William C. Strong, O. B. Hadwen, and Robert Manning.

The President made the official announcement of the death of Francis Brown Hayes, one of the largest and most constant contributors to the exhibitions of the Society. On motion, the Chair appointed Francis H. Appleton, Arthur H. Fewkes, and William H. Spooner, a Committee to prepare a memorial of Mr. Hayes.

The following named persons having been recommended by the Executive Committee, for membership in the Society, were on ballot duly elected:

George Fred. Harwood, of Newton,
Amor L. Hollingsworth, of Milton,
William Bowen Murphy, of Boston.

The meeting was then dissolved.

MEETING FOR LECTURE AND DISCUSSION.

The following paper was read by the author.

A Talk on Gardens.

By David Hill Coolidge, Jr., Boston.

The origin of gardening arose from necessity, and as necessities increased, desires became greater, more luxurious, and more refined. Thus the Garden developed from an enclosure of a few square feet, to the noble English Park, miles in circumference, its boundaries lost in forest scenery, a gorgeous palace with architectural terraces placed in its centre, and the surrounding grounds ornamented by lakes, rivers, and pleasure grounds, varied with

bowling greens, plantations, flower gardens, hot-houses, orchards, vegetable gardens, and in fact, with all the beauties and gifts of Nature, so useful and necessary to mankind.

From these different objects have arisen the different branches of gardening; and as communication extended over the world, new plants were introduced from every quarter of the globe; fruits and vegetables were improved by selection and various processes of culture. Books were written; societies were established with prizes for individual merit, so that today a vast and voluminous mass of knowledge has been accumulated on the subject of Gardening.

Among these several branches I shall touch upon only one, namely, that of ornamental gardening.

Three important factors have influenced gardens to a marked degree. First, the different nations which have successively flourished in different parts of the world; second, the different forms of government which have prevailed from time to time; and third, the different climates and situations.

Of the gardens of antiquity the first one we hear mention of is that of Genesis, Eden, an enclosed garden or Paradise, in which, according to Scripture, our first parents were placed. The oldest historians represent it as a place of remarkable beauty—each according to his own light and all unreliable. In the same doubtful state is the site of this beautiful garden. The inhabitants of Ceylon, however, seem to have settled it to suit their minds, as they to this day point out Adam's bridge and Abel's tomb; also the tree which bore the forbidden fruit (the *Tabernæmontana alternifolia*), noted for its sweet-scented flowers and the beauty of its fruit, the shape of which gives the idea of a piece having been bitten out of it. The inhabitants say that it was delicious before Eve ate of it, but now it is poisonous.

The Gardens of the Hesperides have been described by a geographer of the sixth century B. C., as situated in a deep basin, with steep sides. They were closely planted with various kinds of trees, among which were the tree of the golden apple — supposed to be the orange — pomegranates, mulberries, olives, almonds, together with arbutus, myrtle, bay, and ivy. But the wonders of these gardens somewhat diminish when facts show that they were nothing more than old stone quarries, which still remain; their bottoms covered with excellent soil in which are planted various shrubs and luxuriant fruit trees.

The garden of Alcinoüs, the Eastern king of ancient times, was situated on the island of Capri. It was placed in front of the palace and was about four acres in extent. The first hedge mentioned in history surrounded this garden, which contained three or four sorts of fruit trees, borders of flowers, and beds of vegetables, while two fountains furnished water in an ornamental manner.

Of the gardens of ancient times those of Babylon were the most remarkable. These were built about 2000 B. C. and were considered one of the wonders of the world. They were four hundred feet square and rose with terraces, one above the other, in the form of steps, supported by stone pillars, to a height of three hundred feet, the top terrace being much smaller than the base. Vast stone beams placed on top of columns held up the terraces. The beams were covered by reeds, cemented with bitumen, upon which were placed a double row of bricks laid in cement. The bricks were covered with lead sheathing to hold in the moisture, and upon this was filled in sufficient earth for the growth of plants. Various kinds of trees were planted in rows along the sides of the terraces, thus giving, at a distance, the effect of a completely wooded hill. The river Euphrates supplied water to these gardens. This was raised and introduced into fountains by machinery. The different terraces contained fountains, parterres, seats, and banqueting rooms. These gardens offered all the splendor and luxury of Eastern magnificence, combined with the more peaceful enjoyment of natural scenery.

The Persian kings were very fond of gardens, which were laid out in quadrangles, with long parallel walks, planted with shade trees set in lines and regular figures. The margins of the walks were planted with tufts of roses, violets, and other sweet smelling flowers of low growth, while interspersed between the trees was every kind of flowering shrub. Formal canals ran parallel to the avenues and generally terminated in a large basin, octagonal in shape and ornamented with sparkling fountains. A tower, from the top of which one had a grand view of the garden, was generally placed in one corner.

These few examples are sufficient to give the general idea of the ancient garden and in looking back upon this period we see that gardening was one of the first necessities, and may claim priority

to every other art. The style was naturally formal, nor does it seem so strange that this method should have been adopted, when one considers that picturesque beauty or other poetical associations with natural scenery as an art of imagination, is one of the very last to have been brought toward perfection.

The second epoch of the art of gardening is from the time of the Roman kings, in the sixth century B. C., till the fall of the empire in the fifth century of our era. Italy furnishes us with the best examples.

In general it will be found that the Romans copied their gardening indirectly from the Persians, and that gardening, like other arts, extended with civilization from east to west.

The first garden mentioned in Roman history is that of Tarquinius Superbus, who lived about 534 B. C. This garden adjoined the royal palace at Rome, and abounded with flowers,—chiefly roses, lilies, and poppies. A formal stream of water is the only other feature mentioned.

The grandest gardens in the century of our Saviour were those of Lucullus, who, influenced by his travels in the East, had contracted a taste for its magnificence and pomposity. He had several villas in the different parts of Italy, so that by moving from one to another according to the season he had a very agreeable time the year round. There still remain near Baiæ, in the Bay of Naples, the traces of one of these villas, which, with its terraced gardens, was situated on an elevated, artificial structure, built out into the sea. The palace and gardens were surrounded by sea water, introduced by subterranean passages from without. From the buildings, gardens, and artificial mountains a most extensive panorama was obtained. It is to the folly and extravagance of Lucullus that mankind is indebted for the introduction of the cherry, peach, and apricot from the East.

Up to the time of Cicero, who died in 43 B. C., an occasional reference had been made to a more natural style of planting than the universal formal method. But Cicero himself combined a variety of natural beauties at his villa. He speaks of groves he had formed there; of the natural streams that passed through them from the surrounding hills; and especially of the absence of all appearance of art, and of all false ornament. Many passages have been left to us by other Roman poets and philosophers, full of the most beautiful descriptions of natural scenery; but this was

seldom carried into the garden, which was treated as a manifest work of art, and it was from this point of view that it was regarded. The garden was laid out with straight lines, and basins of water interspersed with masterpieces of sculpture. A flower garden placed near the terraces generally contained a fountain in the centre. The walks were bordered with box and the trees trimmed and sheared into the forms of birds and animals and other most fantastic shapes as well. Alcoves and summer houses offered places for repose. For planting, the plane tree was much used for shade, while the ivy, acanthus, myrtle, narcissus, and roses were generally found in the more ornamental parts. The myrtle and the bay were held in high esteem for their odors, and the mixture of sweet smelling trees became a point of study. Open groves were of frequent occurrence and they seem to have been the only sort of plantations of forest trees then in use. These were clipped, while the method of planting was that of the quincunx.

At the decline of the Roman Empire, gardening came to a standstill. Through the dark ages the peace and quiet of the world were so disturbed by invasions and all kinds of barbarism, that the more peaceful occupations were abandoned for those of war. Many of the gardens were entirely destroyed, and the taste for a quiet life became almost extinct.

From the end of the eighth to the twelfth century, the monks were the only class in Europe who occupied themselves in agriculture, and it is to them that we are indebted for the preservation of the arts of culture.

With the art of printing, about 1440, came the revival of mental light, and the blessings of peace and commerce, and with the revival of other arts came that of gardening.

The great family of Medici, at Florence, were the principal patrons, and the most celebrated gardens of the beginning of the sixteenth century were those of Lorenzo di Medici. The style was simply that of the past, with the usual alleys of clipped trees, trimmed hedges, fountains, cascades, statues, and topiary work. Such is the Italian style seen today, and one cannot help being impressed by the complete harmony of the house with the grounds, accomplished by the architectural treatment and decorations of the steps, and by the building of terraces and balustrades. The natural style of gardening has never made much progress in Italy, as the Italian mind does not seem to enjoy the charms of a

quiet, country life, or to be greatly influenced by the beauties of Nature.

The formal style was in vogue up to the eighteenth century, in all civilized countries where royal gardens were built. The general plans seem to have been closely allied, but influenced by natural conditions. The most noted example of this style is the gardens of Versailles, built in the time of Louis XIV, under the landscape architect, Le Nôtre. A short description of some of its principal features will give an idea of the whole.

Versailles was built in an age of pomp, display, and vanity, and Le Nôtre seems to have been just the man to sink the extraordinary sum of forty millions of dollars into these gardens. Hardly a style of gardening suitable for the American public at the present time!

As we pass through the palace and take a first look at these gardens, one is impressed by the enormous gravel terraces, which in warm weather the radiation of the sun renders almost impossible to walk upon with any comfort.

There is a central vista which carries the eye for miles into the country beyond, enhanced by means of a formal water basin, a "*tapis vert*," and a long canal-shaped stretch of water. The whole is framed by groves of clipped trees, which save the vista from utter tameness and soften the lines of crude formality. The grounds, on either side of this main vista, are divided into many gardens, some of which are very pleasing with their box edging, clipped yews, and statues, effectively standing against a background of horse-chestnut trees.

The flower borders, typical of the French method, are a combination of ribbon and mixed planting. Along the centre of the borders are lines of permanent, high-growing plants, such as standard roses, small Persian lilacs, etc. These are kept in neat, round heads, and in no way injure the bedding plants. This green line is very effective and saves the border from monotony and over coloring. Around each standard are rings of bedding plants — fuchsias, veronicas, and the like — and between these rings are other plants. On the outside of the border run low-growing plants in straight lines, each of which forms a continuous, separate color; the whole effect is very good.

The *tapis vert*, a large, long, turf avenue, is a delightful place to walk, sheltered by trees and adorned with rows of costly statues and vases.

There is an enormous orangery adjoining the palace, built in the face of the terrace. The collection of orange trees planted in tubs is very great, and the expense is in proportion to the number. The effect does not warrant the cost, for they are only placed out of doors, on the terraces and around the grounds, for about five months during the year. They never bloom, consequently they are never seen with their golden fruit hanging upon their branches.

One of the most pleasing gardens is that of the Bosquet du Roi, near the orangery. It is pleasing because the dreary, decaying formality, so universal throughout the grounds, is here wanting, and in its place we have a most restful piece of turf, surrounded with handsome trees with a few neat flower beds appropriately placed, a small sheet of water, and a few fine foliaged plants scattered about.

The colonnade, a grand example of architectural gardening, consists of thirty-two marble columns, varying in color, forming a circle. Beneath each arch is a marble basin supporting a *jet d'eau*, while in the centre of the open space is a large statue of the Rape of Proserpine. The whole is set off very well, as the structure is placed amidst a thick grove of trees.

The statues and fountains at Versailles are innumerable, the most important of the latter being that of the basin of Neptune. As it costs about two thousand dollars every time it plays, it is very seldom one has the pleasure of seeing it in full effect.

The gardens of Versailles do not belong to the present age, and one feels that they are echoes of the past. To judge the gardens from an artistic standpoint, we must look back and remember they were built for the vain and flippant court, and were used as an out-of-doors ballroom. Their elegance, formality, and pompous display, were in harmony with their use, as shown by the following short description of a fête given by Louis XIV:

"The entertainment was continued for several succeeding days, and supplied materials for an illuminated folio, officially published soon afterwards by the court printer. All the gardens, throughout their whole extent, were illuminated from sunset to sunrise by lights emitted from transparent vases. The branches of the trees were clipped so as to represent different orders of architecture, and musicians in the garb of shepherds, were perched everywhere among the boughs, playing sylvan pipes, flutes, and violins innumerable. Tables were loaded with the most sumptuous banquets.

"Chinese fireworks detained a splendid twilight in the firmament, while the atmosphere was odoriferous with the perpetual splash of scented fountains. Masks and dances alternately ministered to the amusement of the court, among whom the sovereign himself was conspicuous by his silver armor, studded with a profusion of diamonds, and the fire-colored plumes that nodded in his helmet."

It is certainly a great relief to mind and eye to go from these gardens to that of the Petit Trianon, the favorite place of Marie Antoinette, to which she and her chosen friends used to fly from pomp and formality, to enjoy the peace and repose of green fields, verdant glades, and the delicious coolness of naturally grown shade trees. She built there a picturesque little dairy on the margin of a natural flowing stream. The whole effect is one of perfect peace and quiet, in which the lover of Nature takes such delight.

The style of Le Nôtre prevailed throughout England, and he was called upon to make designs for many of the royal gardens of the palaces. As time went on, however, people began to think for themselves, and the influence of fashion to give way to native feeling, and general reasoning.

Milton is generally considered the prophet of natural gardening. In his Paradise Lost, published in 1667, there is a charming description of a picturesque garden. This led to writings by Addison and Pope, which so stirred the public mind that a revolution in favor of a more natural style of gardening was started.

William Kent, a young artist of Yorkshire, realizing the beautiful descriptions of the poets, began in 1730 important innovations. The most conspicuous were the destruction of the walls as boundaries, and the introduction of sunken walls or ha-has, as they were called. These did much to harmonize the lawn and park. Kent was the gentleman who, as the saying goes, "Peeped over the wall and found all Nature was a garden."

Brown followed Kent. He acquired a very great reputation, which reached its height when, by constructing a dam at Blenheim, he produced in a week, a grand artificial lake, the largest at that time in the world. Improvement was the fashion of the day, filling Brown's pockets to overflowing. His work, however, was characterless. He treated all places practically the same, whatever the extent or character of the surface, always surrounding them by a narrow belt of trees, while the intermediate space was

broken up by various circular or oval clumps of trees. A serpentine stream was introduced when possible, perfectly uninteresting from the lack of appropriate planting. So stereotyped had the art become that any one might have guessed what would be the plan given by "Capability Brown," as he was nicknamed, and in fact there was an instance in which this was done.

The monotonous productions of this systematic style soon fell into bad repute, and a desire for a purer taste began to be expressed by intelligent writers, who had much influence on the public mind. Among these was Gilpin. His works were largely read. The beauties of landscape, the effect of light and shade, the grouping and outline of trees, and a thousand and one other attributes of picturesque scenery were for the first time placed before the public in a charming and comprehensive form. His works were published between 1770 and 1790.

Other able writers have left us good works which aim at a purer and a more naturalistic style of gardening; among these are Price, Knight, and Repton.

The tendency of these discussions was to refine the taste and make it more liberal, the outcome of which is the modern style of today, which in general terms may be called one of harmony, in which the beauties of the formal style are often skillfully blended with those of the natural, when necessity so dictates.

And now let us turn our eyes homeward from foreign countries, whose governments and conditions are so different from ours.

America is a country of independent homes, and the laws of inheritance are such that it is almost impossible for large estates to remain long undivided; consequently it is comparatively rare that enormous sums of money are expended on large private gardens. Such sums are rightly spent for the good of the public on our noble park systems, which in the last twenty years have made such grand development that they rank among the first in the world.

I had the pleasure, a few years ago, of showing the President of the London County Council,— Lord Meath, who has done so much to open to the public breathing spaces in the crowded districts of London,— our parks and gardens. His praise was unstinted as we examined the Charlesbank, the Common, and Back Bay Fens, but as we drove on through our beautiful suburbs

and parks, he became less talkative, but was evidently thinking deeply. As we were nearing home he suddenly burst out with the exclamation, "I am perfectly astounded; I had no conception that such work was going on in this country. Well may the citizens of Boston be proud of their beautiful city." And when he went back to his smoky London, and published a little report of what he had seen in America, the parks of Boston were the most highly spoken of. It was good praise, from a source that knew. I speak of this to show to what perfection the art of Landscape Gardening has arrived in our parks. In Boston the hand of a true artist has made them beautiful, and they will be tenfold more so in twenty or thirty years, if the true aim of the designer is ever kept as a sacred trust, and not utterly destroyed by turning portions of the parks into enjoyable but inappropriate features, such as race-tracks, parade, or even circus grounds.

But parks are a very small part of this country, and their beauty alone will do but little in making the inhabited portions of this great continent attractive or pleasant.

The private homes, with large or small grounds, alone have the power to make this country beautiful as a whole, and it is to their owners that we must look for that development of taste, which can produce general good effects. Nor is this simply an æsthetic question; it is one of great importance to the nation, for beauty and attractiveness in the home are the source of much genuine happiness. They continually appeal to a man's better nature and keep him at home, when he otherwise would be away from it. As they sweeten his domestic life, they strengthen his character. Anything that has a tendency to add these blessings to our homes is a good thing for the people to acquire.

I remember once walking along a modest street in Liverpool. It was towards the close of a beautiful June day, and the workmen were returning from their daily toils. The street was composed of small houses, set a little way back from the road, so that each house had a small area of ground about it, which we generally speak of as a garden. There was one lot which particularly attracted me. The principal reason for this was that I could not look into it, owing to an irregular screen of flowering shrubs planted on the inside of the fence. The path leading to the house was curved, while the shrubbery was so arranged at the entrance that I could not even see the house. My curiosity got

the better of me and I became a trespasser. I saw a perfect picture of domestic and happy life on modest means, a problem which many fail to solve. The house was placed on one side of the lot, thus giving all the available space that was possible for a lawn, and doing away with those small and detached pieces of ground which are so hard to treat harmoniously. A gracefully curving path led to the front door, and between the boundary and the path was a plantation of flowering shrubs. The treatment of the rest of the ground was simply that of lawn framed with masses of shrubs, with perennials blooming in the margin of the shrub beds, while a few ornamental trees were so planted as to give shade to the path, and to the most desirable portions of the lawn. The house was of brick and sufficiently clothed with vines to relieve it from that bareness so often noticed with our houses. Projecting from the south side appeared a tiny conservatory with open windows filled with flowers, from the midst of which a canary was bidding his nightly adieu to all the world, as the sun began to sink with golden splendor towards the horizon. On the lawn, a man in his shirt sleeves, evidently having just finished a turn with the lawn mower, was sitting down to supper with his wife, two children, and a dog about him. A feeling of contentment was around the place, and was as pleasing to the mind as was the fragrant bloom of the flowers to the nose and eyes.

There is little danger of the gardens of the wealthy being neglected, although their designs are not always in good taste. It is, however, of great importance to the advancement of gardening that art should be displayed in those that are most numerous and most often seen. These are the small places, and what a lack of art we show in most of these in this country!

The oft repeated remark that "my place is too small to landscape" has some truth in it, as Landscape proper must have space in which to lose its lines in the hazy distance. But no place with a few feet of ground is so small but that it can be made useful, attractive, and pleasure giving.

How often we see a house standing in the centre of a lot, with neither tree, vine, nor shrub anywhere about it, nor any perceptible boundary to indicate that both house and grounds do not belong to the public highway. The only "ornamentation" to be seen is perhaps an old iron pot, burned through at the bottom, supported on three sticks, painted some brilliant color, and filled

with red-hot geraniums, growing over a small pile of stones flaming with nasturtiums. Or, perhaps we see the ugly pile of stones, known as a rockery, covered but a few weeks in the year, with often most inappropriate vines. Good taste is not difficult to acquire, for its foundation is truth and simplicity. But it does require a little common sense, and it is only a small amount of common sense that is needed to tell us that iron pots are not made for ornaments in our gardens.

Places are laid out with a view to their use and enjoyment, and with this in mind let us briefly consider what are some of the principal features that would be desirable in successfully treating the small place. It is obvious that the same cut and dried rules or plans cannot be adapted to any two places alike, for each has its own individual character and problems, which must be solved according to existing circumstances. Let us imagine, however, a small, inexpensive house placed on an average sized suburban lot.

The important living rooms are placed in the southern part of the house on account of the warmth in the winter, the pleasant southern breezes, and the beauty of the western sky at sundown. The entrance is on the north side, and the house is so placed that as much available unbroken space as possible is preserved for the pleasure grounds towards the southern portion of the premises.

As the ground slopes considerably towards the south, the material from excavating the cellar is formed into a small terrace, which offers a suitable plateau on which the house may rest. The terrace wall is of simple field stones, laid dry, with considerable batter. As this imaginary household is very fond of flowers, a small plant room is built out from the dining room, opening on the terrace. During the winter months this is entirely enclosed, but in summer the side sashes are removed, the roof being supported by light pillars on which awnings run. Vines on lattices embower the whole. Here the family often take tea, while enjoying the glimpses of their own grounds as well as the more distant views, which when pleasing have been carefully preserved. The flight of steps on the east side of the terrace leads to a small flower garden, enclosed with a low spruce-pole fence, covered with vines, and on the lawn side to the south planted on the outside with occasional masses of shrubbery to break the monotony of the fence line.

The design of the garden is a quadrangle with a narrow straight path running around it, eight feet from the fence, in which

space is a border six feet wide filled with all the old-fashioned flowers so dear to the feminine heart. In the central space of the quadrangle are a few beds, cut out of the turf, of bright colored plants, which are always kept filled from the border, the higher plants being placed in the central bed. To relieve the flat effect of the garden six pyramidal Arbor Vitæs are introduced, one at each corner of the turf space, and one in the centre of each long side. The dark green foliage forms a fine contrast to the brilliant hues around, and in winter saves the garden from desolation.

The lawn, whose broadest expanse is advantageously seen from the living rooms, runs close up to the terrace, at the base of which are two or three masses of shrubs varying in height. Vines are creeping here and there over the stones, partially hiding them from view. The effect of this planting happily unites the house to the grounds; each helps the other in forming an harmonious picture. The surface of the lawn is carefully modeled into gentle undulations, except where a sufficiently flat space is preserved for lawn tennis or croquet. Where the view of the neighbor's barn obtrusively thrusts itself upon the gaze, the ground near the boundary rises in a decided swell, which is thickly planted with shrubs, at the rear of which several poplars raise their pointed heads, shutting out from view the objectionable feature. The turf of the lawn is for the most part encompassed with bushy foliage planted so as to form little bays, according to the topography of the ground. In one of these little dells is placed a covered seat for quiet reading or intimate conversation, partially concealed from the house by a small isolated mass of shrubs placed between the house and the bay. This mass adds greatly to the effect of distance. The shrubs are planted thickly together, as the general effect is better and more immediate. Due thinning, however, is to be practised from time to time, as a too thick growth may demand. In general, the tallest growing plants are placed next to the boundary, lower ones next, while very low shrubs, creepers, and masses of ground-covering perennials are placed in front of all. The sky line of the planting varies, in some places being high while in others it is low. Thick masses are predominant here, while there they are thin and graceful, forming a picture harmonious in itself, but of endless variety. No isolated flower beds are seen in the lawn to mar this picture, for although pretty in themselves, they are detached

objects, which should be looked at separately; conseqnently they do not pleasantly intermingle with the graceful forms and effective tints which are characteristic of the lawn. As the place is too small for many large trees, a few ornamental kinds are planted here and there in pleasing conjunction with the shrubs. The laundry yard is placed as much out of the general view as possible, on the north end of the house. It is surrounded by a lattice fence covered with Virginia creeper and honeysuckles.

Such, in general, are a few of the principles which can be applied to our small places, and when they become universal, the art of gardening will have accomplished much for the happiness of man, for as Pope says: "I pity the man who has completed everything in his garden." The art of gardening when properly understood is ever bringing forth new pleasures and perpetual enjoyment.

Discussion.

Rev. Calvin Terry expressed a strong interest in the subject of the lecture. The general subject has many important features, and in speaking of it a selection must be made. He had often wondered why so many persons who have a small piece of ground, as is common in every country homestead, do not have a garden. The possibilities of such a possession are almost unlimited,—vegetables in variety, freshly gathered every day, all through the season, instead of stale ones from the markets at exorbitant prices; choice, luscious fruits through the entire year, beginning with strawberries and cherries, and then other berries in their season; apples, the prince of all fruits, throughout the year; with plums, peaches, pears, and grapes, all in their seasons, and of the varieties preferred; always fresh from the plants or trees, and at a large saving of expense and avoidance of doctors' bills. Again, one's higher nature is aroused, gratified, and developed, for man is not a mere animal. Cultivation of the garden excites an interest in Nature and her works. The spirit of intelligence manifested in every growing thing commands attention and starts into activity one's curiosity; and every effort to gratify this impulse adds to the power to see and to understand better the natural laws of life and growth. The person who thus learns to observe may notice that the roots of a tree will sometimes grow farther on one side than on any other, and stretch out yards or

even rods to where the best food for that plant may be found, indicating that there is intelligence,— a soul, as it were, in the tree. There are twenty-four hours from sun to sun, of which only nine hours are now by law required for a day's work. With no garden to engage one's hands or thoughts at home, the hours for recreation may be passed in dissipation or vice. But if a garden is awaiting attention and service, one may there be entertained by the music of the birds and other voices of Nature. There one may be carried out of narrow self-consciousness and be taught the spirit of morality and of religion, by observing the wonderful operations of Nature as there displayed. Children may there learn of these things, or be taught about them; as the father of George Washington taught him, that effects are always the results of causes, by writing the lad's name in a garden bed, and sowing therein cabbage seeds, which germinating, soon appeared to the boy's great amazement, until his father explained why and how that name was made to appear and thus directed his mind to thoughts of God by whom all things exist. Thus the garden is a profitable possession for the pecuniary, healthful, educational, moral, and religious returns which come from it to the cultivator. And could the *rich* learn to appreciate this mode of recreation and amusement, there would be less need of attempts to kill time by games, yachting, horse racing, and the like, and there would be less danger of life being suddenly and prematurely ended through ennui or excess.

MEETING FOR LECTURE AND DISCUSSION.

SATURDAY, March 9, 1895.

A Meeting for Lecture and Discussion was holden today at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair. The following paper was read by the author:

BUDDING AND GRAFTING.

By JACKSON DAWSON, Arnold Arboretum, Jamaica Plain.

In preparing this paper on grafting I have gone somewhat away from my subject so as to give you an insight into the records of ancient methods of the growing and grafting of trees in early

times. Many of them you may call absurdities; but as you will see by the following pages, notwithstanding the faultiness of the books on the art of gardening at that time, there are many truths in them which it would be well to observe. What today we call our own inventions we find were practised by the ancients centuries ago, and while their age was one of superstition, in many cases ours is little less so today; as we shall see if we consider that their fallacies have been practised in our own country less than a century ago. Even today, not only the common people, but those who are professed horticulturists, are easily taken in by the glaring descriptions of horticultural products sent out by some of our advertisers. I have seen — right here under the shadow of Horticultural Hall — water chestnuts, bearing leaves of parsley pinned in them, sold to some of our members as something new and curious. It may not have been the ignorance of these members, because they ought to have known better; but it was that same curiosity that so often gets control of the human mind; they want something extraordinary, even if they know it cannot be. They want a change, and if the ancients could have made an illustrated catalogue, showing more impossibilities in the way of fruit and flowers than we find in some catalogues of today, we might call them smart. While there are many conscientious nurserymen and seedsmen who give honest descriptions of the seeds, plants, or flowers they offer for sale, there are many catalogues that are misleading and detrimental to the business. Possibly it is true, as an eminent florist once said, that "there is a new crop of fools every year."

The Origin of Grafting.— Grafting is of great antiquity. It is mentioned by several of the Greek authors —Theophrastus, Pliny, and others — but in a rather unsatisfactory manner. It is referred to by St. Paul in his Epistle to the Romans, chapter XI, verses 17, 19, 23, 24, as follows:

"And if some of the branches be broken off, and thou, being a wild olive tree, wert grafted in among them, and with them partakest of the root and fatness of the olive tree. . . .

"Thou wilt say then, The branches were broken off, that I might be grafted in. . . .

"And they also, if they abide not still in unbelief, shall be grafted in; for God is able to graft them in again.

"For if thou wert cut out of the olive tree, which is wild by nature, and wert grafted contrary to nature into a good olive tree; how much more shall these, which be the natural *branches*, be grafted into their own olive tree?"

It is more than probable that the first idea of grafting originated or was suggested by natural inosculation of branches growing close together in a thicket, whereby the action of the wind, at certain times of the year, had rubbed off the bark of each tree, as you see quite often at the present day, and in a season of calm the two cambiums had been pressed together, had united, and firmly grown together, thereby becoming as one tree. Afterward the original top on one side or the other may have become separated from its own stem and root, and the tree or shrub may have borne two kinds of fruit at the same time. I do not mean by this that if the trees had been of two different species they would have become united, but they might have been closely allied species; for instance, a pear may have become inarched, in this natural way, on another pear; a mountain ash on a thorn; a plum on a peach or almond; or two distinct species of plum or its varieties on nearly related genera. We often see today nurserymen budding or grafting on the peach, plum, or almond, the different species of Prunus, such as *P. tomentosa*, *P. Amygdalus*, *P. Japonica*, *P. triloba*, and others too numerous to mention. However this may be, the art of grafting was practised by gardeners at a very early period. Macrobius, a Roman author of the fifth century, says that the art was taught by Saturn to the inhabitants of Latium. It does not appear to have been known to the Persians or to the Greeks in the time of Homer; and, according to Chardin, was not known to the Persians in his day (1643–1715). Grafting, it is said, was not known to the Chinese till very lately, when it was taught to a few of their gardeners by the missionaries, and to the natives of Peru and other parts of South America by the Spaniards. Some, however, infer from a passage in Manlius, and one in Democritus, that grafting may have been mentioned in some of Hesiod's writings which are lost. Pliny speaks of the mulberry growing on the briar, but whether blackberry or raspberry does not appear. The Romans propagated trees by the same methods now in common use in nurseries; fruit trees were generally grafted or inoculated. Vines, figs, and olives were raised from cuttings, layers, and suckers; willows

were cultivated for binding the vines to the trees that supported them and for making baskets, and they were grown on moist ground as they are today. It was a doctrine held by Pliny, that any scion might be grafted on any stock, and that the scion, partaking of the nature of the stock, had its fruit changed in flavor accordingly. Pliny mentions the grafting of the vine on the elm, and drawing a vine through the trunk of a chestnut, but modern experiments prove the absurdity of the idea that any union can be effected in such cases, even though some of these authors affirm they have seen what they describe. Notwithstanding the ignorance and inaccuracy which these statements betray, the Romans were aware of all our common methods and some of our uncommon ones. They propagated plants as we do; pruned, thinned, watered, forced, and retarded fruits and flowers, and even made incisions and ringed trees to make them more fruitful. One cultivator, C. Furius Cresinus, was so successful as a cultivator of fruits, flowers, and vegetables, that he was accused before the Senate of practising magic, and was obliged to justify himself by showing them his tools. "These," said he, "are the implements of magic which I use; but I cannot show you the care and toil, or the anxious thoughts that occupy me day and night." It is even so today; those who make gardening in any department a success must spend many hours in anxious thought, besides the physical labor.

During the Dark Ages, but for the monks, the art of gardening would have been lost to the greater part of Europe; and many provinces of Europe, which at present are covered with numerous orchards and cultivated fields, nourishing thousands of inhabitants, would have remained a desert or wilderness to this day.

The Greek Geoponica (that is, Horticulturist) was compiled from various ancient authors, both Greek and Roman, more than a thousand years ago. The compiler is commonly supposed to have been one Cassianus Bassus. It contains many useful observations on the cultivation of plants, fruits, and vegetables; but at the same time it is full of absurdities and superstitions. The following extracts about propagation, grafting, and growing of fruits and fruit trees may be interesting at this time: "Grafting can be done in autumn or spring; budding in spring and summer. Grafting is more successful in wet weather, and budding in dry. In dry weather water the grafts every evening. In budding, if

the wood in the billet containing the buds is removed it is weakened; but if suffered to remain the bud will make a more vigorous shoot. In grafting the olive, if the bark is thick, insert the scion under the bark. Walnut seedlings can be taken up, grafted on the roots, and then set out. In making cuttings of grapes have a piece of last year's wood attached to them. Some graft the vine half a foot below the ground, others just at the surface. Inarching is the best mode of propagating the vine; bore a hole through the vine you wish to alter, then pass the branch of the better sort through the hole, and in two years cut off the connection between the graft and its original stock and you will have a good vine. The two vines, of course, are supposed to be planted close together. The quality of fruit of a tree is improved if you graft it over with the same variety, provided your scions come from a tree whose fruit is of better quality. As to the affinities of fruit, the peach may be grafted on the plum, plane tree, or bitter almond; on the bitter almond the peach is rendered more hardy; on the plane tree it produces red peaches. Red peaches are also obtained by pouring cinnabar (dissolved in water) on the kernels just before planting. Graft the plum on pear, quince, or apple; apricot on plum and almond; cherry on the turpentine tree; pears on pomegranate, quince, almond, and mulberry. On the mulberry tree the pears are red. Graft the apple on the wild pear, quince, plane tree, or citron. On the plane tree it produces red apples, and on the citron it bears all the year round. Quinces may be grafted on the oxyacantha. Graft the vine on myrtle, olive, or cherry; on the myrtle, the fruit nearest the stem of the bunch will be myrtle berries; if you work the vine on the cherry, the grapes will ripen in cherry season; this last operation succeeds better if your scions come from a black variety of the grape. Graft figs on the mulberry or plane; citron on pomegranate, mulberry, or apple. On the mulberry it produces red citrons; on the apple black ones. The mulberry succeeds well on white poplar, chestnut, beech, apple, wild pear, or elm; on the white poplar it produces white mulberries. Graft chestnut on walnut; walnut on strawberry tree; myrtle on willow, and laurel on ash. Some graft the roots of olives, if they are above ground, while others propagate it from root slips. Graft pistachia on almond. If you work the vine on the olive, or the olive on the vine, they will produce grapes and olives; the fruit in this case is, as to flavor, a

compound of olive and grape, hence the name Elaistaphylos, that is, olive-grapes."

"I have seen," says Florentinus, "a tree of this description in the garden of Marius Maximus. This olive-grape can also be reproduced from cuttings. Any species of trees can be grafted into the quince or wild fig. When a young vine is too full of fruit, thin it out, for this process improves the size and quality of the remaining fruit. To produce stoneless fruit, split in the middle the part of a cutting, take out the pith, tie up the two parts carefully, and set out the slip. You can also, on the head of a tree, take out the pith without splitting the stock, and carefully insert a peg in its place. This method refers chiefly to grape, peach, and cherry. To bring a barren tree into bearing, gird up your loins, roll up your sleeves, then take hold of an axe or mattock, and being full of wrath approach the tree as if intending to cut it down. Let some one come up to you and beg you not to cut it down, pledging himself at the same time that it will do better next year. Then you, appearing to grant this man's request, will spare the tree, which after this will become a great bearer."

The Object of Grafting in the first place is to perpetuate and multiply and in the shortest possible time, all our choice fruit and ornamental trees and shrubs of value, that do not quickly reproduce themselves from seed or are difficult to grow from cuttings. Nearly all our named varieties of trees and many of the shrubs are propagated by grafting, so that they may the sooner become plentiful as well as a source of income. Should we resort to the propagation of our pears, peaches, plums, apples, and other fruits by cuttings and layers, it would take us many years to reap the benefit of our labors; and many would go hungry while they were waiting for the orchards of Bartletts, Seckels, Angoulemes, and other pears, as well as the Baldwins and many other apples; or the plums, cherries, peaches, and various other fruits. Yet this idea was vigorously advocated a few years ago, both in England and America by those who wanted "nothing but own root trees." Even if it were practicable, which I have reason to doubt, it would not be profitable and I do not know of any one who has planted orchards of our standard fruit trees from cuttings, and gathered fruit from them. Old, or otherwise worthless trees can be regrafted with new or more desirable kinds, and in a few years

made to produce heavy crops of marketable fruit, thus rejuvenating whole orchards in a few years, which, if they had to be replanted with new trees would require at least ten years before they came into bearing. Old vines in graperies can be grafted, and in a short time will give heavy crops of the new varieties. Seedling hybrids of fruits, many of which would take at least ten or fifteen years to become fruit-bearing on their own roots, can be top-grafted on old trees and brought into bearing in a very few years, so that the hybridizer can see the result of his labors, and by the time the original seedling would naturally come into bearing he can have enough to supply orchards for the whole country. By careful selection of stocks trees can be dwarfed, as for instance by grafting the pear on the quince; the apple on the Paradise stock; or the cherry on the Mahaleb. Fruit buds may be grafted into espaliers to supply blank spaces; or other buds to fill up where branches have been lost; or to strengthen the fruit. Plants can be made fertile by grafting in the missing sex in all diœcious trees. Rare species, where only one of a kind has been brought from a great distance, can be propagated and made plentiful by grafting it on some near or allied species, or on its own roots. In small places many varieties of nearly equal vigor can be grown on a single plant. Species or varieties which are naturally delicate become more robust when worked on strong growing stocks. Vines produce larger and finer grapes when worked on more robust sorts, such as the Syrian, or the Black Barbarossa. It has been said that the double yellow roses, such as *sulphurea plena* and others which seldom open their blooms to perfection, grow and flower freely when worked upon the common China rose.

Mr. Knight says that the flower-buds of garden roses worked on wild roses, where they were abundantly supplied with nutriment, gave finer roses than they would have done had they retained their natural position. He reports many similar experiments upon pear and peach trees with similar success; but in the case of the pear, the buds, grafted earlier than the end of August or the beginning of September, became branches instead of flowers.

I have, myself, grafted hundreds of roses from November to March, and had them bloom as well or better than good-sized roses lifted from the ground at the same time. I found that those grafted early, say during December and January, flowered better

than those grafted in February and March; these later ones growing more to wood. The working of trailing varieties of shrubs or trees on tall stocks makes the so-called weeping trees; for instance, the Camperdown elm, weeping mulberry, cherry, salix, *Prunus Chamœcerasus*, and many others, which, on their own roots are trailers or creepers. All sorts of variegated and cut-leaved foliage trees are preserved and multiplied by grafting. It is also employed to aid the healing up of wounds, by grafting on them scions or strips of bark.

Physiology of Grafting.—Grafting and budding are governed by the same physiological principles. There must exist an affinity between the stock and the scion or else there can be no permanent union.

The physiology of grafting is, that the shoots springing from the buds of the scion become united to the stock by the newly generated tissue, which tissue, when once united, determines the ascent of the sap, rising from the stock; which sap, after being elaborated into the true or proper juices by the leaves on the scion, descends by the inner bark. The sap, however, must be sufficiently homogeneous (*i. e.*, must be prepared in plants of the same family) to be readily absorbed by the growing cellules, near which it passes. In other words, each cellule elaborates sap according to its own nature, and if the ascending sap has only an incomplete analogy with the wants of the scion, the latter does not thrive, though the organic union between it and the stock may take place; and if the analogy between the alburnum of the stock and scion is wanting, the organic union does not long continue. Hence, evergreen scions seldom succeed for any length of time when grafted on deciduous stocks, or the apple on the pear, or *vice versa*. Thus, in a physiological view, the epochs of vegetation are the principal points to be attended to, as no plant can be grafted on another which does not thrive in the same temperature. Nor can two plants in which the sap is not in motion at the same time be successfully united. This is because it is only when cellular tissue is in a state of activity — when it can form accretions — that a vital union can be formed and maintained and a reciprocal activity must exist in stock and scion for that purpose. No union can take place between the parts of two plants previously formed, except when both parts are in the act of forming the vital tissue, union being effected only by the coalition of the newly generated

tissue, thrown out by such parts as have the power of generating it. This power does not exist in the heart wood nor in the outer bark, but only in the alburnum or rather the substance imbedded between the alburnum and the inner bark, constituting the cambium.

Mr. Knight says the effects produced upon the growth and product of a tree by grafting are similar to those which occur when the sap is impeded by a ligature or by the destruction of a circle of bark; it acts by obstructing the descending sap, and so causes fruitfulness. The modification effected by the graft therefore is a subject of practical interest and importance to the grower or cultivator, for although the graft alters neither the species nor the variety of the stock it has considerable influence on its habits as well as on the production of fruits and flowers.

Affinity of Species. Graft and Stock.—Plants of the same family have an analogous origin and can be grafted only on one another with a prospect of success. The success of the operation, even within the family limits, will not always be complete; perhaps from some difference in their organic structure. In such cases practical experience must necessarily become our guide. The pear and the apple can be united only for a short period. Soft-wooded plants do not succeed well with hard-wooded ones, nor ligneous plants with herbaceous ones. The peach and the apricot are grafted on each other with difficulty, while both do well on the plum. Most cherries do well on the Mahaleb, but the Mahaleb does not succeed well as a graft on other cherries. The sweet chestnut will graft on the oak, but will not on the horse-chestnut. The medlar, which has solitary flowers, does well on the thorn, whose flowers are in corymbs. The Chionanthus, so nearly allied to the lilac with its panicled flowers and simple leaves, will do well only on the European or flowering ash, which has compound leaves. The Photinia, allied to the beam tree *(Pyrus Aria)*, and the Eriobotrya, allied to the medlar, both evergreens, will graft on the medlar, and not on the hawthorn. The cotoneasters, amelanchiers, and *Pyrus Aria* all do well on the hawthorn, and by experience last longer, but make slower growth than they do on the mountain ash. *Pyrus arbutifolia* grafts well as standards on the mountain ash. *Berberis aquifolia* will grow on the common barberry, and *Prunus Lauro-Cerasus* does well on the Bird cherry.

In almost every case the grafting of deciduous plants on evergreens has proved a failure. It is always best to unite by grafting only such plants as have some analogy between them, such as vigor, time of commencing to grow, and hardiness. If any difference exists it should be that the graft be later than the stock in vegetating, and also more vigorous and hardy. Weak stocks and weak scions produce worthless trees. When a weak scion is grafted on too vigorous a tree it is difficult for the scion to absorb all the sap furnished by the stock, and an evenness of growth cannot be established between the stock and the graft; then follow weakness and disease. It is preferable to have the scion stronger than the stock; for instance, the pear on the quince and the cherry on the Mahaleb; otherwise the tree will be less vigorous than if perfect harmony exists between the two parts, and growth being thus tempered tends more to the production of fruit. The French often double-graft a tree to make its growth more uniform; for instance, a strong-growing stock is grafted with one of an intermediate growth, and on the latter the variety they wish to propagate; the stock should always be strong enough to receive the scion, for if it is weakly, although the graft and stock may unite, it will almost always make a sickly tree.

Practical Directions.— The term grafting is usually confined to the operation with detached scions; and in every kind of grafting it is essential that the two parts (the scion and the stock) be in close communication with each other, not by the wood or bark, but by the inner bark or alburnum in the tissue of which the cambium flows. The more points of contact here the greater the chance of success, which also will be assisted by a similarity of texture between the scion and the stock.

The best season for grafting out of doors is in the spring, when the sap is in motion (say from March to June); and for grafting under glass, from the first of August to the last of September, with half-ripened wood; in December and to the last of March, with dormant wood. During the midsummer days grafting either in doors or out is not often a success, although with great care it might be accomplished the year round. In all kinds of grafting it is better to have the stock started a little ahead of the scion, and it is not safe to graft out of doors with scions that are started unless you can cover up or shade them; for the evaporation that takes place at this time weakens the scion too much

before it has time to unite with the stock. A calm atmosphere and warm temperature, rather than wet and cold weather, are more conducive to success, and certainly more agreeable to the operator than when it is cold and stormy. The stone fruits, such as cherries and plums, should be the first ones operated on; afterwards the pears and apples.

The tools necessary for use in grafting are a saw, a pruning knife, grafting iron or wedge, a budding knife, a pair of good pruning shears, a whetstone to keep your knives in good condition, a bunch of raffia, bast, or waxed cloth for tying the grafts and keeping them in their places when set; also some kind of grafting wax to cover the wounds to protect them from the air and water. A number of grafting machines have been invented, especially in France, where, since the ravages of the Phylloxera, these machines have been in great demand, as they were thought to be of great advantage in grafting the grape; but an expert workman will do the work quite as well with the tools named above. There are many varieties of grafting wax and mastic, as well as other compositions for the same purpose. In the old times a composition of clay, cow manure, and chopped straw was used, and is used by some even today; and as it retains moisture better than the modern grafting wax it is recommended for coarse work and for covering large wounds in large operations.

For grafting in the open air the following compound is much used in this country: common rosin, four parts; beeswax, two parts; mutton tallow, two parts; all melted together. When cool it is applied by the hand, or, being melted, applied with a brush.

In many large nurseries, where apples and pears are grafted in winter, this wax is heated and applied thinly with a brush to sheets of cloth, and after becoming cool the cloth is torn into narrow strips and used in tying up the grafted roots and plants. I have found that where only a limited supply is wanted, it is cheapest to buy it already prepared, and for years I have used that which is sold by nearly all seedsmen as Trowbridge's grafting wax; it is as good as, or better than, any of the French mastics.

All scions should be cut before the sap begins to flow rapidly (say from January to the middle of March) for all trees that are hardy, and whose wood is not injured by freezing. But many plants with slender stems are injured by freezing and if scions

from them are wanted to propagate by grafting, they should be taken off in early autumn and heeled-in in loam, sand, or moss, in a moist pit or cellar for future use. I have found this especially applicable to hybrid roses, where the wood is wanted for winter use. A great loss of grafts is sure to be the result if you do not have the wood thoroughly ripened and taken off early in autumn and buried in the earth. Ten degrees of frost will injure many varieties of rose grafts. In selecting scions bear in mind that the wood should not be too coarse but of medium texture, healthy, and well ripened; nor should you use fruit buds, unless you want them for a special purpose; although at times we often have to use any wood we can get for scions, especially in the case of varieties which from any cause are scarce; but as a rule it is a bad policy, and as soon as possible, new or stronger shoots, from the one so grafted should be grafted on young vigorous stocks. This is an essential point and should not be overlooked, that weak or sickly scions grafted on sickly stocks soon produce a degenerate race. In good nurseries, where careful attention is given to these points, the stock trees are carefully pruned (or ought to be) and cultivated on purpose to produce a healthy stock of wood for grafts or other uses. The grafts should not be cut from the scion until just before they are to be used. Never allow scions to suffer from exposure to dry air, cold, or wet. In collecting scions of evergreen trees, I think it best to cut them from the parent plant just at the time of using them. If you must keep them over winter the best way is to lay them thinly in sand, and keep in a deep pit or cellar where it is cool and somewhat moist; if they are put in too thickly they will heat or rot.

The Methods of Grafting.— These are so numerous that a systematic classification of them would be difficult. It would only be a waste of time to try to enumerate them all, as that would be of no practical value except to show in how many different ways the work can be done. Almost every propagator has his favorite style. Those methods that are practised by skillful propagators are best; they are few and may be summed up as follows:

Inarching, or grafting by approach,
Bottle grafting,
Cleft grafting,
Side grafting under the bark, or inlaying,
Crown grafting,

Saddle grafting,
Splice, tongue, or whip grafting,
Root grafting,
Veneer grafting.

Inarching or Grafting by Approach.—This is without doubt the most ancient of all grafting methods. From time to time Nature gives us examples of it in roots or trees which have become united where they have been bruised or pressed together. Man was no doubt quick to perceive and take advantage of this hint and when once tried, to improve on it. This method is practised both in doors and out; and at one time was extensively used by both nurserymen and gardeners. When I was a boy it was about the only method in use for the propagation of azaleas and camellias. It is even now employed by some to propagate varieties which are difficult to graft otherwise.

The time for inarching out of doors is from early spring until July or August, while the tree is in active growth, and as the scions are still attached to the parent plant they can be inarched in either a woody or herbaceous state. Under glass it can be done at all seasons of the year. The simplest method is to remove from both the stock and scion plants a thin slice of the bark and alburnum from two to three inches long; then, bringing both cut surfaces together in such a manner that they shall fit exactly, to tie them firmly with bass or raffia, and cover the wound with grafting wax to keep out the air.

Another kind of inarching is similar to tongue grafting. An incision is made in the stock and the graft, and the two are bound together and waxed. Sometimes the top of the stock is cut off and tongued at the time of grafting, and the graft is joined at the cut extremity. Another way is to cut off the stock and cut out a V; the scion is then cut on both sides to fit into the stock, then inserted in the V and completed by tying carefully as in other cases. This method is much used in grafting high standard weepers, which are then tied carefully and waxed as has been directed. In grafting by this method, the trees or plants to be grafted must be in close proximity to each other. The scion plants must be either planted around the stock tree or in pots and so arranged on stands as to be easily brought in contact with the branches of the stock tree.

Grafting by approach is also used to fill up vacancies in graperies and fruit houses, to restore main branches, or increase the size of the fruit. When the graft has taken hold, cutting it from its parent stem is an important matter. It must not be done too hurriedly, but gradually, making a small incision at first, and increasing it from time to time, until the final separation is made. This may require several weeks. As soon as this is done the wound is cut smooth and covered with grafting wax.

Bottle Grafting.— This is only another method of grafting by approach. The lower end of the scion is buried in moist soil, or is inserted in a bottle of water, to keep it in good condition until the cut surfaces are united. In all other particulars it is identical in principle with inarching.

Cleft Grafting.— This system was practised at a very early date, and is a method much in use now, to top-graft old trees in orchards, or to renew individual trees, as well as young stocks that have become too large to bud, and in order to bring them into bearing more quickly. This was probably one of the first kinds of grafting that the Pilgrims used in the new world, and for a long time was practised the most of any kind. But, compared with other methods, it is rather crude, as there is a large amount of cut surface to be healed over by the new growth, which often takes a long time. In cleft grafting the stock is cut off with a saw, at a point at which to insert the scion. This surface is smoothed off with a sharp pruning knife. Then with a knife, a grafting iron, or thin chisel, split the stock through the centre, being careful to divide the bark at the same time so as to leave the edges smooth. The cleft is kept open by means of a wedge. The scions are then cut in the shape of a wedge, and fitted into the cleft (one on each side if the stock is large) taking care that the two cambium-layers meet on the edge near the bark. If the stock has very thick bark slightly incline the lower end of the scions inward to the cleft to make sure that some part of their cambiums may come in contact with the cambium of the stock. In large stocks it is not necessary to bind the graft before waxing; but in smaller ones it brings the parts into closer union and holds them there. When the stocks are small it is not necessary to put in two scions, or to split the stock entirely across, but only part way, holding the cleft open with a knife while inserting the scion. This is a much better way when it can be done, as there is less cut surface to be covered.

When the stock is very large, more than two scions can be used by making two parallel clefts, so placed as to leave the pith in the centre untouched. March and April comprise the usual time for grafting out of doors. Cleft grafting can also be performed in the latter part of the summer by using well-ripened wood. The grafts would make no growth but would merely become united. Terminal cleft grafting is only a modification of cleft grafting, and is done by splitting the bark through the terminal bud without heading down the stock. The scion is cut with a regular double slope and inserted the same as in any cleft grafting. The stock and scion are then firmly bound together. As soon as the stock and scion begin to grow, the shoots are pinched but not cut off, as they draw the sap towards the graft, which is essential in plants that are slow to unite. This kind of grafting is used on both the walnut and the fir tree.

Side Grafting.—This term is applied to a number of processes of grafting in which the head of the stock is not cut away. The most simple side graft is that in which the scion is cut with a long splice, perfectly smooth and thin to the bark. Then from the stock a thin strip of bark and wood two or more inches in length is cut. Fit the barks exactly together and bind firmly. This is a favorite method of grafting the camellia and azalea, and should be done under glass. In side grafting with a vertical cleft, the scion is cut half its length on both sides in the form of a thin wedge. The stock is cut with one stroke of the knife, allowing the blade to penetrate the alburnum. The scion is then thrust in the cleft thus made and held in its place by a ligature of bass or raffia. This kind of grafting can be used for camellias, or in fact any plants under glass. It is especially used in herbaceous grafting, such as chrysanthemums, potatoes, tomatoes, coleus, cacti, and other succulent plants. In succulent plants it is not necessary to pare them down as thin as in woody ones, but to leave them more in the form of a wedge. Side grafting can also be done under the bark in spring when the stock is in an active state of vegetation, so that the bark will lift easily from the wood, as in the case of budding. The scion is cut with a long splice, thin towards the point. An incision is made in the bark as in T budding, cutting through the bark but not into the wood. The bark is then raised and the scion slipped under it. It is then tied and covered with grafting wax, to exclude the air. There are other systems of side grafting, but they are only modifications of one another.

Crown Grafting is similar to cleft grafting. It is practised in spring, as soon as the bark is easily separated from the wood, the stock being headed down several weeks before the time of grafting. The scions should be cut with a flat, sloping cut on one side; but instead of splitting the stock the bark is divided from the top downwards an inch or more, and lifted as in budding. The scion is then inserted under the bark. A small implement of wood or ivory, made in the form of the scion, can be used to advantage in preparing a place to insert the scion much more easily than by lifting the bark with a budding knife, and with less fear of bursting the bark, or injuring a tender scion. In another form of crown grafting, the scion is cut half way through and the wood removed, leaving a square shoulder at the top near a well-developed bud. A corresponding strip of bark is removed to admit the scion. The two parts are then fitted together and bound with waxed cloth, and the top of the stock as well as that of the scions is then covered with wax to prevent evaporation.

Saddle Grafting.— By this method the stock is cut, with a slant on two sides into the form of a wedge, while the scion is cut just the reverse, so that when in position it stands astride of the stock. But it takes more time than other forms of grafting. The rhododendron is now largely grafted in this way.

Tongue or Whip Grafting.—This method is most commonly used in nurseries, for grafting fruit frees, where seedling stocks from one to three years old are used. The stock and scion are nearly of a size. The scion is prepared with a long sloping cut, and the stock in the same manner. A small cleft or split is also made about midway of the cut portion of both the stock and scion, forming a tongue on each. These tongues are inserted into the cleft in the other part, thus forming what is called a tongue or splice graft. They are then bound with waxed cloth, heeled in, in boxes about a foot in depth, in finely sifted sand or loam, and kept in a moist cellar until spring, when they are put in a warm place until they show signs of starting. They are then planted in nursery rows, covering the graft to the first eye.

Root Grafting.— Many plants, that are difficult to grow from cuttings, can be successfully grafted on pieces of roots, either their own or those of another plant. Many woody plants, of which we have no allied species, can be grafted on pieces of their own roots.

All methods of grafting can be used in root grafting; whip, splice, side, cleft, or veneer. Always cut the roots as they grow from the stem, keeping the neck up. Plants that grow from root grafts are numerous. The pæony, bignonia, wistaria, rose, hydrangea, clematis, chestnut, plum, pear, apple, dahlia, magnolia, and many others can be root grafted. Sometimes when we receive a new plant and can find no stock to work it on, I cut off a few of the roots and graft them with their own branches. I tried to propagate *Cæsalpinia Japonica* for two years from cuttings, but did not succeed. Last fall I dug up the plant, selected some of its best roots, and veneer grafted some of the best shoots upon them; now I have several plants. *Hydrangea vestita*, a hard plant to grow from cuttings, does well on the roots of *H. paniculata*. *Combretum purpureum*, a rare stove climber, can be grafted on its own roots. *Euptelea polyandra*, a scarce Magnoliaceous plant, and many others, can be worked successfully in the same way. When I speak of root grafting, I mean pieces of detached roots — not seedling plants, cut down and grafted on the crown. For many plants, grafting on the crown of the root will be better than on the stem, on account of the softness of the tissue beneath the ground surface. This is a favorite way with roses, so as not to have them sucker from the roots.

Veneer Grafting.— This is one of the best methods of propagating hard wooded plants under glass, and can be practised from November to April, and from August to October. In this mode of grafting the plants should be established in pots for the convenience of handling, as well as for the success of the operation. Seedling plants are the best, but many varieties can be grown from cuttings or layers. Pot the plants in early spring, and plunge them in frames or in a sheltered position, giving them attention, as to watering and pruning, during the summer or until wanted for use. In grafting, select a smooth place on the stock, and with a sharp knife make a slight cross cut downwards in the stock, cutting through the bark and slightly into the wood. Then insert the blade two or more inches above, cutting off a thin slice of the bark down to the cross-cut. A corresponding slice is taken off the scion. They are then fitted together so that the two cambiums meet, then tied firmly and placed inside of the greenhouse in close frames, and slightly sprinkled overhead when necessary. Keep the plants close for the first few days and syringe when

necessary to keep up a moist atmosphere. As soon as the plants begin to knit together, air can be given during the morning and evening, and after a week or two the air can be kept on all day. The time taken by the different varieties to unite varies from two to four weeks. After the grafts have begun to unite, they should be removed from the frames, but kept inside the greenhouse for a month or more before being planted out or removed to their winter quarters. My method has been, as soon as I am certain the grafts are all right, to turn them out of the pots and transplant them thickly in boxes. As soon as they are well established they are put out of doors in a sheltered place to harden off. When no double frames are at hand, I have found a bed of sphagnum moss, three to four inches deep, a good substitute, laying the plants on their side, and covering the base of the graft an inch or two with damp — not wet — moss. This gives out a gentle moisture, and the graft is not subject to sudden changes of temperature, as it would be otherwise. All coniferous plants are much more easily propagated by veneer grafting than by any other method. Their treatment after grafting is similar to that of other plants, except that they should not be headed in until the second year.

Budding.— This consists in taking a bud with a portion of bark attached to it, from one tree, and inserting it in some portion of another, or in the same tree. In order to do this, a longitudinal incision is made through the bark of the stock, to the wood; a cross cut is then made at the upper end forming a letter T, into which a bud, previously prepared, is inserted, either with or without removing the inner wood from the bud. In budding, it is necessary that the bark of the stock should part readily from the wood without being torn. If the bud is inserted when the flow of sap is abundant, it immediately comes in contact with the nourishment it requires for its support. In budding, it is necessary to have a budding knife to prepare the buds, and for opening the bark to admit them; also tying material to hold the buds in place after they are set. In selecting the buds, the young shoots of the previous year's growth are the best — neither too gross nor too weak. The best buds are those about the centre of a stem or shoot. As soon as the scions are cut, the leaf blades should be removed, leaving a small portion of the leafstalk attached to it which facilitates the handling of the bud. Buds should never be

allowed to get dry, nor should they stand in water too long. Unless they were shriveled when received, damp moss or cloth is the best material to keep them in.

Shield Budding.—This is the method most practised in nurseries. It is done from July to September, according to the kinds and varieties of plants to be budded. There are many forms of budding; such as budding with a cross-shaped incision for chestnuts or other plants with large buds; and inverted budding, when the sap is in excess, as in the maple.

Veneer Shield Budding.—This method is sometimes employed when the sap does not flow freely enough to allow putting the bud under the bark. It consists of an oblong, four-sided strip of bark, marked with four cuts, leaving the eye or bud in the centre. This strip of bark is lifted with the budding knife, and removed with the bud from the scion. A corresponding strip is taken from the stock, and the prepared bud is fitted into its place, and treated the same as any bud.

In many places, especially in Holland, double budding is practised on roses; that is, two buds are inserted opposite each other in the same stock. There are various other methods of budding used, but the common shield budding I have described answers all purposes, and is almost universally practised. In preparing the bud, take the shoot in your left hand; then at about a half-inch above the bud, cut through the bark and a little into the wood back of the bud, and the same a half inch below it; next make a horizontal incision in the stock first, and from this make another incision downwards, about an inch long; lift up the edge of the bark by passing the blade up to the horizontal position, at the same time holding the bud by the leafstalk; slip it into the incision as quickly as possible, so that the bud shall not become dried. If the upper part of the bud does not fit, it must be cut across so as to allow the bud to sit firmly on the stock. When the bud is fitted, bind it with bass both above and below, leaving only the bud and the leafstalk exposed. At the end of a week or ten days the ligatures should be looked over to see that they are not strangling the stock. If they are cutting into the stock they need to be loosened only, as it is not always safe to take them away entirely. Budded stocks are usually headed down to about six inches above the bud the following spring. As soon as the buds begin to grow,

it is necessary to tie them up to the stalk that is left. Disbud all suckers from the stock, before they get too strong, by rubbing the hand quickly up and down the stalk while these shoots are young. When the buds that were inserted are a year old, the old stems should be cut off smoothly to heal over.

In the propagation of plants by grafting, it is fully as necessary to know the kinds of stocks to work on, as it is to know how to perform the operation, and while I have not the time at present to speak of all the stocks used, I will give a list of the principal ones.

The five-leaved pines, such as *Cembra*, *parvifolia*, and others, all do well on *Pinus Strobus;* and on *P. sylvestris* (the Scotch pine) and *P. resinosa*, all the rest of the pines will succeed. *Picea excelsa* will do for all the spruces, while *Abies pectinata* and *A. balsamea* will serve well for the Silver firs. The common arbor vitæ *(Thuja occidentalis)*, and *Chamæcyparis pisifera* make good stocks for the *Retinosporas.* Almost all junipers do well on the red cedar, *(Juniperus Virginiana).* The common hemlock *(Abies Canadensis)* is good for all the varieties except *A. Douglasii* and *A. Mertensiana.* On the common European larch, *(Larix Europœa)*, you can graft all the varieties, excepting *Pseudolarix Kœmpferi.* For Rhododendrons, the general stock used is *R. Ponticum*, but *R. maximum* might also be used. All deciduous Rhododendrons (Azaleas) can be grafted on *R. viscosum* or *R. nudiflorum.* All types of *Kalmia latifolia* can be worked on the species. Most varieties of Amelanchier, some forms of mountain ash, and *Pyrus Aria* and varieties, make good plants when grafted on the hawthorn. All apples will thrive on seedling stocks, but while *Pyrus Toringo* and *P. baccata* varieties will grow on the common apple, they do better on seedlings of *Pyrus baccata. Prunus mirobalana* makes a good stock for nearly all plums; and all of the flowering section do well on it, such as *Prunus tomentosa*, *P. triloba*, etc., and I think the Peach is longer lived when worked on the plum. *Pyrus communis* is a good stock for all species and varieties of pear, except for dwarfs; although if it were plentiful enough, *Pyrus betulæfolia* would make one of the best of stocks for pears on high light ground. The Manetti, brier, and multiflora are best for most roses. All lilacs will succeed well if grafted on the privet and lilac; but I think, if it were plentiful enough, *Syringa villosa* would make a much better stock for them. Clematises graft easily on the roots of *Clematis Flammula*, and

C. paniculata. *Cornus florida* makes a good stock for all its varieties. *Parrotia Persica*, *Hamamelis Japonica*, and others will graft on the common witch hazel. All lindens can be grafted on the American or European varieties. *Vitis Labrusca* and *V. æstivalis* make good stocks for all hardy grapes. *Euonymus Europæus* is a good stock for all the Euonymus family. *Acer platanoides* does well as a stock for all the forms of maple excepting the Japanese maples, which will grow only on *Acer palmatum* or *A. Japonicum*. *Robinia Pseudacacia* is good stock for all the species and varieties of Robinias. All Wistarias grow well on the roots of *W. Chinensis*. *Caragana arborescens* suits all the Caragana species and varieties, and also *Halimodendron argenteum*, and possibly other Leguminosæ. *Viburnum opulus* and *V. dentatum* make good stocks for all Viburnums; *Catalpa speciosa* for the other Catalpas, and for *Tecoma radicans*. *Ulmus campestris* is best for all the English elms, and *U. Americana* for the American types. *Quercus rubra* is best for most of the oaks, although I believe the red oaks would do better on *Q. rubra* var. *tinctoria*. All the hornbeams and hop hornbeams, work more readily on *Carpinus Betulus* than they do on our own species. The European white birch *(Betula alba)* is the best for the general run of birches, while *Alnus incana* does well for the alders. *Corylus Avellana*, the English hazel, is a good stock for all the species and varieties. The common horse-chestnut *(Æsculus Hippocastanum)* is good for all its varieties, as well as the red and the yellow buckeye, *Æ. rubra* and *Æ. flava*. The fine varieties of hickory will graft on *Carya porcina*, and *C. alba*, but I believe they will graft more easily on *C. amara* (the bitter-nut); it is of much more rapid growth than the other hickories, and while young the tissues are softer. The common chestnut is a good stock for all the Japanese, English, and Spanish chestnuts. *Cerasus sylvestris*, (the Mazzard cherry), is as good a stock as can be found for standard cherry trees, and *C. Mahaleb* will serve well for dwarfs. *Prunus demissa* will graft on *P. Virginiana* but not on *P. serotina*. The American and European beeches make equally good stocks for all varieties of that genus. *Gleditschia triacanthos* is a good stock for the weeping, and also for all Japanese varieties. *Pterostyrax hispidum* makes a hardier plant if grafted on the Halesia, than it does on its own roots. *Magnolia tripetala*, or umbrella tree, and *M. acuminata* (the

cucumber tree) make good stocks for all deciduous magnolias. The umbrella varieties have more roots and are more easily transplanted.

Discussion.

Mr. Dawson exhibited many drawings illustrative of the several methods of grafting and budding which he described. He also brought a large number of living plants, which had been budded or grafted, and which represented not only all the methods of which he had spoken, but the practical application of each to a great variety of plants, including evergreen and deciduous, hardy and tender, trees, shrubs, and vines. At the conclusion of his lecture, many from the audience gathered about him, to examine his exhibits; to question him as to details; to witness the practical illustrations which he gave, and to hear his explanations of details as he performed the operations.

Shield budding, he said, should be the method used on most nut-bearing trees, as it proves the most successful one for them.

Where one has a rather light sandy or gravelly soil to be used as a fruit garden or orchard, he thought *Pyrus betulæfolia* would be the best stock on which to work pears, being naturally adapted to thrive in such a soil.

In grafting beeches the work should be done near to the surface of the ground, to secure the best results.

Never bud or graft grape vines, until the stock plants are in full foliage; otherwise bleeding may ruin the whole work, and even kill the stock plant.

MEETING FOR LECTURE AND DISCUSSION.

Saturday, March 16, 1895.

A meeting for lecture and discussion was holden today at eleven o'clock, the President, Nathaniel T. Kidder, in the chair.

The following paper was read by the author:

Some Notes on Tomatoes.

By W. M. Munson, Horticulturist to the Maine State College Agricultural Experiment Station, Orono, Me.

Next to the potato, the tomato stands, perhaps, at the head of the list of garden vegetables in commercial importance. In

Maryland alone there are as many as twelve thousand acres devoted to this one crop, while in New Jersey, Delaware, Ohio, Indiana, and Illinois, the crop is of special importance.

By far the larger portion of the area devoted to this crop is employed in supplying fruit for the canning factories, and it is this demand of the canneries which, more than any other, has given the great impetus to tomato culture. The credit of introducing canned tomatoes as an article of trade is due to Mr. Harrison W. Crosby, who made his first venture in 1848, while steward of Lafayette College, Easton, Pennsylvania. There was a ready demand for the goods, and with increased supply and improved machinery, the cost has been reduced from fifty cents per can, in 1848, to seven cents at the present time.[1] With this reduced cost, the output of the factories has increased to an almost incredible extent. The total output for 1894 was nearly six million cases of two dozen cans each, as compared with less than three million in 1887.[2]

Classification and History.— Our garden varieties of tomatoes belong to two distinct species — *Lycopersicum pimpinellifolium* Dunal, and *Lycopersicum esculentum* Miller. The former is represented in the garden by the "Currant," or "German Raisin" Tomato, which is of weak spreading habit, with small thin foliage and very delicate flowers, arranged in two ranks on a long raceme. The whole aspect of the plant is delicate, and the long racemes of fruit are not unlike clusters of currants. This species is found wild in Peru and Brazil, and but little is known of its history. It has not been modified by domestication, and probably has not been long under cultivation. The chief value of this species, aside from its use as an ornamental plant, and to a limited extent for preserves, is in the breeding of new types, as I shall suggest in another connection.

Lycopersicum esculentum, the ordinary tomato, is undoubtedly a native of Peru, but is spontaneous or indigenous throughout Mexico, and as far north as Texas and California, in a form closely approaching the Cherry tomato of the gardens. So far as we know, it was first cultivated in the south of Europe. It is

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[1] Am. Grocer, Jan. 11, 1893.
[2] Ibid, Jan. 9, 1895.

mentioned as early as 1561,[1] while in 1583 "the fruit was eaten upon the continent, dressed with pepper, salt, and oil.[2]" It was grown in England in 1597,[3] but for many years was used only for ornament. In 1700[4] Tournefort mentions seven varieties, one of which was pale red, one striped, two yellow, one white, and two red; but the culture was still neglected, for in 1819[5] only four red varieties are mentioned, and the pale red sort is not named.

England was much behind the Continent in the general culture of the tomato, but our own country was still later. The fruit is said to have been introduced into Philadelphia by a French refugee from St. Domingo in 1798,[6] and in 1806 M'Mahon writes: "The tomato is much cultivated for its fruit in soups and sauces, . . . and is also stewed and dressed in various ways and very much admired."[7] It was introduced into Salem, Mass., about 1802 by an Italian painter, Corné, "but he found it difficult to persuade the people even to taste the fruit."[8]

The tomato began to be cultivated for market in this country about 1829, but not until 1839 was it mentioned in the premium lists of this Society.[9]

Variation in the Type.—As before remarked, the Cherry tomato of the gardens approaches very nearly the wild type of the species, but the tomato is one of the most variable fruits we have under cultivation, and is readily susceptible to the influence of selection. Its variability lies mainly in size, form, and number of cells, and, as shown by Bailey,[10] the latter character may, to a large extent determine the former. In nature there is a definite number of cells in the fruit of any given species, but one of the first effects of cultivation is to render this character inconstant. In our cultivated varieties of tomatoes, we find almost as many different forms and combinations of cells as there are individual fruits. In the wild type there are normally two cells. The effect of cultivation has been to increase the size of the fruit by the interposition of new cells, this condition resulting in the angular shapes characterizing many of the garden forms. In

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[1]Anguillara, Semp., 217.
[2]Dodonæi Stirp. Hist., 455.
[3]Gerarde, Herball, 1st ed., 275.
[4]Inst. Rei. Herb., I, 150.
[5]Trans. Lond. Hort. Soc., III, 347.
[6]Manning, Hist. Mass. Hort. Soc., 40.
[7]M'Mahon, Gard. Calendar, 319.
[8]Felt, Annals of Salem, II, 631; cited by Manning, Hist. Mass. Hort. Soc., 40.
[9]Manning, Hist. Mass. Hort. Soc., 248.
[10]Am. Naturalist, June, 1887, 573.

other words, the modern large fruited and irregular sorts have been developed first by the augmentation of cells in the primitive type, and later by the modification of the flower, and the production of an abnormal number of parts.

The direction of variation and order of development suggested by Bailey[1] seem most natural. Starting with the Cherry tomato and adopting, slightly modified, Bailey's expression of the evolution of forms we have:

CHERRY:
- *Pear-shaped and oblong sorts*,— King Humbert, Nisbett's Victoria, etc.
- *Angular sorts*,— Orangefield, Hundred Day, etc.
- *Yellow apple-shaped sorts*,— Green Gage, White Apple, etc.
- *Large red sorts*,— Little Gem, The Cook's Favorite, and thence to Paragon, etc.
  - *a*. Grandifolium,— Mikado, Potato Leaf, etc.
  - *b*. Validum,— Tree Tomato.

The history of the introduction of our common sorts is, no doubt, familiar to most of you. The old Large Red of the earlier catalogues was followed in 1862 by Fiji Island, and in 1864 by The Cook's Favorite. In 1866 Tilden appeared and then in rapid succession Maupay, Keyes's Extra Early, Boston Market, General Grant, Trophy, and Paragon.

Paragon was a marked step in advance over all former introductions. It was really the first of the round or apple shaped varieties to attain prominence, and gave a great impetus to the culture of the tomato as a field crop. It was a triumph for the application of correct principles of selection, for, in the production of this variety, the habit of a whole plant rather than the character of an individual fruit was considered.

In 1880 Perfection appeared and during the ten years following, Favorite, Beauty, Dwarf Champion, Lorillard, Ignotum, and a host of less worthy sorts have followed, until it would seem that the limit of profitable variation may have been reached.

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[1]Cf. Bailey, Bul. 31, Mich. Agr'l College, 6.

Breeding New Varieties. Is it true that the limit of improvement in the tomato has been attained? For New England I should say emphatically, No. In general the shortness of our season is such that a new and much earlier variety is needed to insure a crop before heavy frost. With this end in view we have for several years been breeding new races of tomatoes.

In 1891 crosses were made between Ignotum, one of the most valuable market varieties, and Peach, an early and productive sort which is too small and soft for general culture. Ignotum was used as the female parent. Plants resulting from these crosses were grown in the field the following year with very satisfactory results. There was a marked influence of the male parent in the character and habit of the plants, but, save in size, the fruits were not very different from Ignotum. The increase in earliness and productiveness was very marked. Whereas the average number of ripe fruits on pure Ignotum plants previous to frost was but *eighteen*, that on the crossed plants was *forty*. But, as before remarked, the size was considerably reduced.

Seeds were saved from these crossed plants and the following year a comparison was made between two generations. There was a falling off of nearly forty-four per cent in the total number of fruits borne, and of thirty-one per cent in the number ripened before frost. The past season three generations were grown side by side, with practically the same results.

A cross between Lorillard and Peach, carried along the same lines as the one just mentioned, has behaved in a very similar manner. In both cases the second and third generations showed a tendency to split up into various forms, and showed the influence of the male parent more plainly than in the first generation. In other words, although promising forms have been obtained, no type has as yet been firmly fixed.

The most interesting and important work we have done in breeding tomatoes is in connection with a true hybrid between the two species. The variety selected for the female parent was Lorillard, a well-known sort of medium size and valuable for forcing, but only moderately productive under field culture. The male parent was Currant — so far as I know the only representative of *Lycopersicum pimpinellifolium*. The hybrid is almost exactly intermediate between the two parents. The form and general texture of the foliage is suggestive of Currant, while the size

is equal to that of Lorillard. The blossoms though larger, were of the type of Currant and the fruit is borne on long racemes, very similar to those of the male parent. The individual fruits, however, were fully four times the size of Currant. The object in view in this work has been to combine the earliness and the productive qualities of Currant, with the size and vigor of the common type. To this end, crosses have been made between the hybrid already mentioned and the female parent, Lorillard, and again between this cross and the same parent. The results are in every way encouraging, but the end is not yet. The crosses still retain the distinct evidences of the influence of the original male parent, but are gradually increasing in size and now frequently show a more or less angular form, as found in the common type.

Many attempts have been made to secure a yellow tomato with a distinctly blush cheek; but as a rule no satisfactory results have been obtained. One variety has been sent out as "Lemon Blush" but in our own experience the blush has never appeared.

We have repeatedly made crosses between the red and the yellow varieties, but in every instance red fruits have resulted. At the present time, however, we have under observation a selection from Golden Queen, which is very promising. From our studies of this strain, I am convinced that the desired type may be produced more easily in a southern climate or under glass, than is possible under field culture in our latitude. The same plants produce much more highly colored fruit in February and March than in December or January, while cuttings from plants which bear well-colored fruit in the forcing-house, as a rule yield less highly colored fruit when grown in the field. It is hoped by continued care in selection to fix the type.

There is little doubt that varieties or strains, "run out," or lose their distinguishing characteristics. This variation in type may, and often does, occur very early in the life of any given variety, but with careful selection on the part of the grower, a type may be preserved for many years. It must not be understood, however, that "running out" necessarily implies deterioration, for such is not the case. A type may lose its distinguishing characteristics by reason of improvement, as well as from neglect or other causes tending to deterioration.

The Ideal Tomato.— Naturally the per cent of solid tissue in any fruit is in direct proportion to the number of cells, and in producing a new tomato, we must bear in mind a given ideal. The ideal tomato must be of medium size, firm texture, rich color, perfectly smooth, and must be early and prolific. Such a variety we have not at the present time.

My own taste would call for a fruit which is solid and "meaty" — one which contains thick cell walls, but relatively few seeds. Such a fruit was secured in the best strains of Ignotum, while that variety was in its prime. The Stone also is of this type, but neither is satisfactory in New England. The type represented by Yellow Victor, which has a hard, almost woody, core, is of course objectionable. On the other hand, some tastes demand a fruit with a large per cent of "pulp," a character found in those sorts with relatively few cells. For such tastes Chemin Market is excellent. But while it is one of the most prolific sorts we have grown under glass, this variety is so late as to be discarded for field culture.

Solidity, however, is largely an individual rather than a varietal character. As already noted, the solidity of a fruit depends on the relative number of cells or seed cavities. It should be added that a further controlling factor, is the number of seeds present. Now we know that the amount of pollen available has an important bearing on the seed production of most fruits. In other words, within certain limits, the amount of pollen received by a given flower, by determining the number of seeds produced, may to a large extent control the size, form, and relative solidity of the resulting fruit. Every grower is familiar with the small unmarketable fruits so common in the house during winter. A careful study of these fruits will reveal the fact, that most of them are nearly if not quite seedless.

Cultural Notes.— It is unnecessary at this time to go into the details of the culture of tomatoes. It may be well, however, to call attention to some of the more salient points which have received our attention during a somewhat extended study of this plant,— leaving any points of general interest to be brought out in discussion.

Our practice previous to setting plants in the field, is to sow the seed in flats about April 1, and, as soon as the plants begin to crowd, to remove them to three-inch and later to four-inch pots.

I am aware that some of the best cultivators combat the idea that frequent handling is of advantage in securing strong stocky plants, but in our own experience the practice has always been found beneficial.

Each year but strengthens our conviction that, if properly handled in the house, tomatoes may, with good results, be set in the field much earlier than is commonly supposed. The notion often expressed that the tomato is specially susceptible to a chill early in the spring, seems to be without foundation. The check frequently observed is more often due to lack of available plant food than to the "shock" of transplanting.

Trimming the plants in midsummer has usually resulted in hastening the maturity of fruit already set, and as only a relatively small portion of the crop will ripen in any case, the practice may be regarded as a good one for amateurs. It is questionable, however, whether there is sufficient advantage to warrant the practice in commercial plantations.

The old notion that tomatoes do best on relatively poor soil, was long ago exploded,[1] but comparatively little accurate work has been done toward determining the specific element or combination of elements which will produce the best results. Deductions from work conducted in Maryland[2] indicate that potash has a tendency to produce a relatively large percentage of acid in the fruit, while phosphoric acid seems to have a similar effect on the sugar content. Voorhees[3] has found that nitrate of soda, while increasing the yield, does not do so at the expense of earliness of maturity, if used in small quantities or in two or more applications; but if large quantities of nitrate were used in one application, maturity was retarded. Moreover it was concluded that nitrogen is the ruling element in the growth of the tomato, though its effect is dependent on the presence of a full supply of other elements.

In general, we may conclude that while heavy fertilizing does not lessen productiveness, the best fertilizers are those which act quickly, or hasten growth early in the season.

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[1]Cf. Bailey & Munson, Bul. 21, Cornell Expt. Sta.
[2]Patterson, Bul. 11, Md. Expt. Sta.
[3]Bul. 63, N. J. Expt. Sta.

Forcing.— The winter forcing of tomatoes is one of the most interesting and satisfactory operations of the gardener, and many have found it a profitable enterprise. The crop is one which demands care and intelligent management, but such conditions are well repaid by a ready demand for the products at high prices.

The most important conditions are: a warm, light, house — one having a two-thirds span facing the south being preferable,— strong bottom heat, rich soil, careful training, uniform temperature, care in watering and in pollinating; and above all, good judgment and constant watchfulness on the part of the grower.

Our practice may be briefly outlined: We always plan for two crops each season and as, in our northern latitudes, from four to five months are required for the tomatoes to reach maturity, we arrange that a large part of the growth of each crop shall occur without special expense for heating. The first crop is started about the first to the middle of July, and, if put on the fruiting benches in September, the crop will be in its prime in season for the holidays. The second crop is started in October, and is thus ready to take the place of the first lot, when their fruit is off in February.

When on the fruiting benches, we usually grow the plants in boxes eighteen inches square and a foot deep, four plants being placed in each box. Each plant is trained to a single stem, and thus occupies about one and one-half square feet of floor space. In training, strong flax cord, the size of wool twine or a little smaller, is used. A single strand extends from the base of each plant to the roof, and the plant is secured to the cord by bands of raffia.

Some commercial growers consider it necessary to attend to the pollination of each individual flower. Tomato flowers are highly self-fertile, however, and the only attention we have found necessary is, on bright days when the atmosphere is relatively dry, to give each plant two or three sharp taps with a padded stick.

From an extended study of the subject, I am convinced that failure to secure satisfactory results in forcing tomatoes is very commonly due to an insufficient supply of pollen. We know that when only a small amount of pollen is supplied to the stigma an undersized or irregular fruit invariably results; while, as already

suggested, the small unsalable fruits whose history has not been traced, are almost invariably seedless, or supplied with a very small number of seeds. I therefore regard some method of artificial pollination as of the greatest importance.

The varieties found most satisfactory for forcing are Lorillard, Ithaca, Chemin Market, Optimus, and Golden Queen. In our houses, for several years past the average crop from several of the leading varieties has been about 2.5 pounds per plant or 1.7 pounds per square foot of floor space. If we are sure of fifty cents per pound, the crop is a paying one.

A Brief Resumé.—The sum of the whole matter then, is this:

1. *Lycopersicum esculentum*, from which most of our common varieties of tomatoes have been developed, is a native of Peru, but is spontaneous or indigenous as far north as Texas and California, in a form closely approaching the Cherry tomato of the gardens.

2. The tomato was first cultivated in the south of Europe and is mentioned as early as 1561.

3. The fruit was used for food in 1583, but was slow in coming into general use. Seven varieties were known at the beginning of the eighteenth century, but not till a hundred years later did the culture become general in England.

4. The tomato was known and used as an article of food in this country in 1806, but was not grown for market until about 1829.

5. The modern large fruited and irregular varieties, including the French Upright, and the Grandifolium or Mikado type, have undoubtedly been developed from the Cherry tomato or a closely related form; this development has apparently come about largely by the augmentation of cells in the primitive type.

6. The results obtained from crossing the common tomato with *Lycopersicum pimpinellifolium* indicate a promising field for the development of new types.

7. Solidity of fruit is an individual, rather than a varietal, character, and this character is often dependent on the amount of pollen received by the flower.

8. If properly handled in the house, tomatoes may be set in the field much earlier than is commonly supposed, with good results.

9. Trimming plants in midsummer has usually resulted in slightly hastening the maturity of fruit already set.

10. While heavy fertilizing does not lessen productiveness, the best fertilizers are those which act quickly and hasten growth early in the season.

11. For New England the most profitable work with tomatoes may be carried on under glass. For this purpose Lorillard, Chemin, Optimus, and Golden Queen, are the most promising.

Professor Munson exhibited a variety of photographs, to show the methods of training in the forcing house, and in field culture; the effect of varying amounts of pollen on the flowers of one plant, *i. e.* where deficient; when sufficient; when excessive. Others showed the effects of different fertilizers used in both greenhouse and field; and also where different amounts per acre were used.

Discussion.

William C. Strong asked : When do you put out young tomato plants in the field, in spring? How do you avoid the killing effects of spring frosts?

Professor Munson replied that they get them out by the fifteenth of May, or as soon after as the weather will permit. The best results are always obtained from the earliest settings. If properly hardened off, tomato plants will endure a much lower temperature than is commonly supposed. One reason that young plants are so easily cut down by frost is the usual lack of vigor following transplanting. He believed that this weakness is more often due to starvation than to a sudden change of temperature. The supply of nitrogen, in a readily available form, seems insufficient for the needs of the plants. A solution of nitrate of soda — say three ounces to a gallon of water — applied at the time of setting will, by inducing vigorous growth, render the plants better able to withstand checks of any kind.

Benjamin P. Ware expressed much interest in the statement made in the lecture, regarding artificial pollination of tomato flowers, and he asked if it was necessary in field culture.

Professor Munson replied, No, the forces of Nature — wind and insects — attend to it there.

Mr. Strong asked whether tomato plants could be made to produce fruit more than one year in New England. He spoke of the tomato plant as being perennial in Southern California, he having seen plants in fruit there which were more than one year old, although not in a thrifty condition. He had lately seen, in the island of Jamaica, plantations of them producing fruit in great abundance, and in perfection throughout the winter months, especially on the southern side of the mountain range, where the soil is comparatively dry. It would seem that the fruit might be sent to our northern markets with profit, the passage by steamer being less than six days. But it is found to be very difficult to get it here in good condition. It is a fruit that does not keep or carry well.

Professor Munson said he had sometimes taken two crops of fruit from the same plant. After the first crop had been taken from a forced plant, in January, the old growth was coiled upon the top of the box of soil, in which it grew, and some fresh soil put over it. Soon after, new shoots started out, grew well, blossomed, and bore a crop of fruit — the second crop. The same result is often obtained by cutting back the old plant when the first crop is off, and allowing new shoots to grow from the eyes near the base. In practice, however, better results are obtained from the use of young plants,— either seedlings or rooted cuttings.

Mr. Strong spoke of a peculiar experience. One season he planted a large field of tomato plants. The lot was upon a side hill, and sloped to the south. In July a terrific hail storm swept over the district, causing the almost total destruction of this crop throughout that district. Singularly enough, his field, on the southerly slope of a hill, almost entirely escaped injury. From this field he sent to market a forty bushel load of fruit, which brought to him one hundred and sixty dollars. He then again referred to May planting out of tomatoes, and asked if it would be expedient to place temporary boxing around the young plants, to be covered with glass when frost was threatened.

Professor Munson had known of boxes being used as described, and the crop saved by them. But another method was to run a cultivator through all the open ground in the field, just before night; this would induce a more rapid evaporation, which would prevent frost bite.

A stranger stated that on tomato ground made rich with phosphates and other fertilizers, the fruit cracked badly.

Professor Munson had conducted some experiments with this point in view, but had observed no ill effects from heavy fertilizing. Fruits from heavily manured plats were uniformly larger and smoother than from plats less heavily fertilized. It is questionable, however, whether excessive manuring will be found profitable in commercial plantations, as the increase in yield is not sufficient to pay the increased cost of production. In some work carried on at the Cornell University a plat 30x60 feet was given nearly three tons of rich compost; while an adjacent plat, under ordinary commercial treatment was given less than one-fourth as much. The average yield per plant in the former case was but three ounces greater than in the latter.

A stranger said that some tomato plants set out early grew well and attained good size before blooming. But soon after the flowers opened they fell off. He wished to learn why they did not set fruit instead.

Professor Munson replied that not knowing the other conditions he could not explain the result.

The questioner stated his belief that tomato plants could not develop perfect flowers except when in a warm atmosphere.

Professor Munson said that oftentimes plants which have formed fruit in the house, fail to set any after being planted out. We may accept the almost universal principle, that checking plant-growth induces fruitfulness.

Another gentleman inquired whether allowing a plant to become pot-bound would promote fruitfulness.

Professor Munson said that if other conditions were favorable it would. But there is a limit to the power of good influences to secure fruitfulness; for if the other conditions are unfavorable the crop of fruit may fail.

Professor Munson, in reply to a question, said he thought one element of success in growing forced tomato plants in boxes is that the roots are thereby somewhat confined.

LECTURE AND MEETING FOR DISCUSSION.

SATURDAY, March 23, 1895.

A Meeting for Lecture and Discussion was holden today at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair. The following paper was read by the author:

EDIBLE NATIVE FUNGI.

By HON. JOHN M. KINNEY, Boston.

Prejudice is stronger than reason, and it is often impossible to persuade men to do what is manifestly for their own interest, if there is any lingering memory or superstition which attaches a bad odor to the thing we want them to do. The tenacity with which we cling to prejudice is illustrated by nothing better than by the contempt and dread with which the community treats the Fungus family, condemning all varieties as unfit to eat, excepting the *Agaricus campestris* or Common Mushroom.

English and European fungi have been carefully studied and classified and their edible and poisonous qualities ascertained by a few men of science and enterprise. Badham, Berkeley, Cooke, Johnson, Smith, Bell, and Mrs. Hussey, have devoted a great deal of time to the subject, and have published books with profuse illustrations, showing to the eye by color and form what their words fail to convey. No American has, until late years, undertaken to publish any treatise on the subject. Now we have the valuable work of Capt. Julius A. Palmer, Jr., with its fine colored plates, and clear descriptions, which are full and complete, and easy to comprehend, and the United States Agricultural Reports of late years give considerable space to drawings and descriptions, showing that the people are demanding information in this regard.

There is no fruit or vegetable which, in my opinion, possesses the nutritive value of the mushroom. Badham, in his "Treatise on the Esculent Funguses of England" says (p. 136), "I have this autumn myself witnessed whole hundred-weights of rich, wholesome diet rotting under trees; woods teeming with food and not one hand to gather it; and this perhaps in the midst of potato blight, poverty and all manner of privations and public prayers against imminent famine."

It is desirable that a more general interest should be developed in the direction of knowledge of the wild mushrooms. Of course the wealthy can buy the cultivated article in the market, whilst others having the desire for this food are unable to gratify their taste in this direction, from lack of information. This information is easily attained by a little judicious application, and in a short time, exercising reasonable care, a person will be safe and make no mistakes and secure to himself a food product very nutritious and palatable. The supply is abundant. In fact "the woods are full of 'em," and within a short distance of this city, edible fungi can be found in great quantities.

The Italians are great gatherers of mushrooms and dry them for use in the winter. I had the opportunity about thirty years ago, to notice what these people were doing in this way. There was a small paper mill in Wareham, just below the Tremont station, where a number of Italians were employed. One day when driving past, I saw the hillside near the mill covered with old boards on which these people were drying mushrooms by the heat of the sun. It happened that I was at that station when these same people, late in the fall, were making their exodus to the city and they were literally loaded down with dried mushrooms in bags and bundles.

I find that the Italians at the North End are experts in the selection of wild mushrooms, as well as in the preparation of delicious dishes. I have frequently had sent to me from an Italian family, maccaroni cooked with mushrooms, which I consider excellent eating.

In the great pine forests of Plymouth and Barnstable counties, where the deer freely roam protected by law, are immense quantities of the Boletus family. With these I have become more familiar than with any other variety. Some years ago I was induced by a lady friend of mine, to collect a large quantity of these mushrooms to make into catsup, for which she had a recipe. I set boys to work, and got altogether more than two thousand pounds; but for some reason I failed to connect on the catsup, and fermentation setting in, I soon found that I had an excellent mushroom vinegar. With this as a basis, I made a superior table sauce, equal to the famous Worcestershire; indeed, by many people it was considered better, as it had a delicate mushroom flavor, not apparent in the other. Many other varieties

of edible fungi were found in this locality, but I am not so well acquainted with them.

It is an accepted fact that some of the mushroom types are poisonous, whilst others are edible; but the problem to be solved is, which are good and which are bad. It must be understood at the outset, that there are no general rules, capable of universal application, whereby the edible fungi may be at once distinguished from the poisonous. Our task would be an easy one, if such a royal road could be discovered. But unfortunately, every effort to apply general rules has failed, and no possible course remains but to become acquainted with every individual species which we resolve to eat, and at the same time with those we should specially avoid. Therefore it may be proper to remark that there are some features manifested in connection with poisonous or disagreeable fungi, which should be borne in mind, as tending to diminish labor in investigation. For instance it may be concluded that fungi which possess a distinctly disagreeable odor may be discarded at once, as unwholesome. Then again, any kinds, the flesh of which when cut or bruised shows a change of color, especially to a *dark* blue, should be avoided. Even the common mushroom will turn brown when cut, and some of the other edible species, will show a slight change; but it is the immediate and rapid change to a deep blue, which should be accepted as a danger signal. It may be safely understood that any species of which a small fragment when eaten raw is biting or unpleasant, is not worthy of experiment. Another precaution may be added, that such fungi as contain a milky juice which exudes freely on being cut or wounded should not be eaten, without careful determination. Once for all, it must he insisted on that, in order to avoid danger, no fungi should be eaten at random, and only those which after careful examination are found to agree with both figure and description (unless practically well-known) should ever be prepared for the table. No method is so safe as that which consists in mastering the characteristics of a few species, especially when pointed out by one who is practically conversant with them, and increasing the number by experience. There are certainly a great many common species to be found in this country which may be eaten with safety, but if only ten or twelve of these are well known, they will furnish all the variety which an ordinary person will require. Experiments in eating unknown

fungi or those concerning which any doubt exists, should on no account be encouraged. We may not possess so many truly poisonous species as has been supposed, but that we do possess some is an undoubted fact; and it should be remembered as a caution. Thoroughly experienced fungus-eaters seldom experiment on unknown species, but only upon those which are known to be harmless, or which by their natural affinities afford no possible reason for doubt.

Characteristic and accurate figures are a great help in the determination of species, but figures alone are scarcely sufficient for the inexperienced, and should always be supplemented by a reference to the written description. Features of importance may be overlooked in scanning a figure, but these may be emphasized in the description. Moreover there are features which cannot be represented in diagrams, which may nevertheless be very evident in the fungus itself, such as viscidity, odor, and taste.

It is a popular error that a mushroom may be distinguished from a toadstool by the cuticle of the cap. Some persons hold that if the cuticle or skin of the cap (or pileus) can be stripped off readily, then the fungus in question is an edible mushroom; but if it cannot be stripped off, it is poisonous. The cuticle is certainly separable in the mushroom, both wild and cultivated; but in numerous instances it is separable in other species that are certainly dangerous; whereas in some excellent species which are constantly eaten, there is no separable cuticle. I was advised by Capt. Palmer, (a high authority on fungi, whose book on American fungi I have already mentioned), when in doubt as to the safety of any species, to eat a small piece, and the next day to try a larger piece; if no unpleasant results occurred it might be considered edible. I would advise all persons who have an interest in this subject to study his works.

The assumption that fungi of the same species growing in different localities, may be so modified by circumstances as to lose or acquire poisonous qualities, has not been established. One of our most virulent species has undoubtedly been eaten in Russia with no disagreeable results, but there is no evidence that the character of the fungus had changed, whilst there is every reason to believe that the process of cooking adopted was calculated to produce such results. It is very probable that the poisonous principle existing in any fungus as it is grown, may be

neutralized by the use of acids or alkalies. Fungi of the mushroom type grow rapidly, and rapidly decay. Chemical changes take place so readily that it is important that this class of food should be cooked as speedily as possible after it is gathered, before any appreciable change takes place. It is by no means certain that stale mushrooms are innocuous, and in some cases where mushrooms have been accused of producing unpleasant effects in persons of delicate constitutions, it is possible that the cause was not in the mushrooms originally, but was developed by incipient decay.

We would dispel the illusion that the common mushroom is the type to which all edible fungi must conform, and that all others should be compared with it. There are some which have the same flavor, or one closely resembling it, whilst there are others of a totally different kind. Much disappointment is liable to follow if, in all cases, it is expected to meet with the mushroom in some modified form. There is as much difference in the peculiar flavor of different species as there is in the different kinds of flesh. No one would be satisfied if veal tasted like mutton, or roast pork like roast beef; and there is just as much difference in the taste of the edible fungi. In some the taste is perfectly novel, and produces a new sensation; for instance, there is not the least resemblance between the Puffball and the ordinary mushroom. It is in this great variety that much of the charm lies; otherwise it would be better to adhere to the common mushroom than to venture upon others which would be no better than substitutes. In tasting of a new dish, therefore, it is better to forget the old one for the time, and expect to partake of something which has to rest on its own merits, and not on its resemblance to anything else.

As a natural consequence of this variety of flavor, it is essential that each species should be used by itself, and that two or more kinds should not be mixed together, in a sort of hotch-potch, where no particular flavor prevails, but all are reduced to a horrible mediocrity. A professed fungus-eater would no more think of sitting down to a dish composed indiscriminately of half a dozen species, than would a gourmet of mixing his wines, or combining his venison with his salmon and turkey. Much of the excellence of a dish of fungi depends upon the cook, for a bad cook will spoil the best dish that was ever invented. It is no part

of our present design to give special instructions in the art of cooking mushrooms, for there is an art in it which makes all the difference. Frankly, the ordinary domestic cook, without experience, never succeeds well, even with the common mushroom; it requires a kitchen genius to present them at their best. It has been said that "Mushrooms are the gift of Nature, whilst a good cook is the gift of God."

The edible qualities of various Agarics are well known to the common people on the continent of Europe. They eat them freely, and make money by their sale, whilst in Great Britain, scientific men have ventured to a large extent to explore the field and forest in search of additions to the table list. On the continent, eaten fresh, dried, preserved in oil or vinegar or salt, fungi constitute, for weeks together, the food of many people; and in Rome there is an inspector of fungi, who daily examines the supplies which come in from the country, and condemns all that are unsound or unsafe to be thrown away. Curiously enough, the law points out by name our favorite *Agaricus campestris*, as poisonous, and orders it to be thrown into the Tiber. Here again the question of locality occurs, suggesting that climatic, or some other unknown cause, may make a radical change in the fungi, as in the case before mentioned, in which a variety whose poisonous quality here is well settled, is eaten with impunity in Russia, and this opens up a wide field for scientific investigation.

It is commonly supposed that fungi are the consequence of decay, and we do find the greatest number of them on decaying substances; but we find them also on glass, flints, metals, in poisonous solutions, and in pure and undecomposed water.

An instance is given of a blacksmith who threw aside a piece of iron at night, fresh forged, and in the morning found it covered with an Ethalium two feet in length. Gun-barrels and sword-scabbards left in damp, close rooms have been covered with a blue mould in a few days. The rapidity with which many if not all fungi grow baffles calculation; the great Puffball, *Lycoperdon giganteum* will grow as large as a peck measure in forty-eight hours, and specimens of *Agaricus campestris* have developed from the button (which is a bud the size of a pea), to a mushroom as large as a coffee saucer, in a night; but it must not be supposed that all this increase of size in a single night is actual growth. Agarics are many weeks forming under the surface of the ground;

their cells are small and closely packed, and ready to expand when the moisture and heat are favorable. When the auspicious moment arrives, the cells absorb abundant moisture and, stimulated by heat, swell out to their full size.

"Any vegetable productions which can increase so fast and are so omnipresent are worth studying to find out their good and bad qualities; and it is probable that among the poisonous fungi, there are many which are as valuable to the pharmacopœia as others are to the table." This statement, written more than twenty years ago by the late R. Morris Copeland, has been verified by the use of Muscarina. This remedy is an "active toxic alkaloid of syrupy consistence, from *Agaricus muscarius*, or *Amanita muscaria*, or fly agaric, a poisonous mushroom, used in Kamschatka as an intoxicant. The alkaloid is freely dissolved out by water and dilute acetic acid." A full description of the physiological effects can be found in Pattee's "Compend of Materia Medica." The poisonous effects manifest themselves very soon after eating, causing heat and a prickling sensation in the fauces of the throat, with burning, and severe sickness at the stomach. In light cases the sickness is relieved by vomiting before any serious injury is done, but at other times the victim is sick for many days, and occasionally death ensues. In the intoxication produced by the *Amanita muscaria*, ludicrous effects are produced; a talkative person cannot keep silence or secrets; one fond of music is perpetually singing, and if a person under its influence wishes to step across a straw or small stick, he takes strides or jumps sufficiently long and high to clear the trunk of a tree.

The juice of *Agaricus muscarius* will kill flies; the fumes of dried puffball when burned will stupify bees and small animals; even the spores of *Agaricus vellereus* made one experimenter very sick; a few grains of *Amanita verna* will kill a dog. *Russula emetica*, as its name shows, is a violent emetic, and a larger dose will kill.

With so much that is dangerous, there is little real risk attendant on the use of the varied forms of fungi, for they can be easily classified, and are quite distinct in their appearance and effects. There are simple rules which, carefully applied, greatly reduce the chances of mistake, and simplify choice. Any fungus which has a disagreeable smell should be avoided; for, although there are a few bad smelling ones that are good kinds, they are very rare.

It may be asked, what is a bad smelling fungus? It may be answered more easily by saying that a mushroom has a good smell; it has a decidedly earthy or fresh odor, reminding one of cool shady nooks in the forest, amongst the ferns and lichens. To describe the odor in words would be impossible. Find a good mushroom and smell of it, and the standard will be always established. Every good fungus will smell like a mushroom, though often with a difference, but no one will ever call the odor unpleasant or impure. Bad kinds will have a peculiar sharpness in their woody smell, or a dirty smell like decaying flesh, and some are so bad smelling that their presence cannot be endured in a room. If the odor of a fungus is satisfactory look at its color. Nearly all the edible fungi are pleasant colored — white, with delicate tints of rose; light shades of yellow and orange; light brown and gray; but the majority are white, pink, orange, or drab. I have a theory that soon the poisonous alkaloid will be eliminated or neutralized from the dangerous species, so that all mushrooms may be rendered edible and useful, and all risk removed. This opens up a wide field for chemical investigation, and I trust that some chemist may be found competent.

I have not attempted to give a list of the numerous varieties, as this can be much better done by the study of some standard work on American fungi, with illustrations and descriptions, and I would specially recommend the works of Capt. Palmer, for this purpose.

I have endeavored to collect some points of interest to bring to your notice, and hope I have aroused a little more interest in our native edible fungi.

Discussion.

Rev. Calvin Terry said that it appears that there is danger of serious illness, and possible death, if one indulges in this kind of food without some knowledge by which to make a proper selection. We have but one life and it behooves us to get the necessary information before we begin to use anything that is new and strange to us. We need to learn what color distinguishes the wholesome varieties, what peculiar forms are to be selected, and what localities are to be visited to find this delicious food material.

Mr. Kinney said that color is not a sure indication of wholesomeness. The only sure way to learn how to distinguish the edible varieties is to get a book containing full and clear descriptions of this class, with accurately drawn and correctly colored illustrations. Take the book with you into the field, meadow, or woodland, and, having found a living specimen, carefully examine it in all its parts, and having found in your book a picture resembling it, compare the two critically, and see if the description also in the book is applicable to the plant in hand in all respects; but bear in mind that the appearance of the living plant changes as the days of its brief existence go by, and that when it has passed a certain stage decay begins and poisonous qualities are developed. The common mushroom *(Agaricus campestris)*, when ready for use as food, has pink gills, which later become brown and finally black.

Miss Jones said she had seen, in a French book, a statement of what was claimed to be an infallible rule, that if the juice of any mushroom would not quickly discolor a bright silver surface, it was a safe one to use as food.

Mr. Terry suggested that it might be true that there is a difference in the constitution of individuals which allows some persons to eat freely, with safety, of certain vegetables or other foods which are poisonous to others.

Professor George F. H. Markoe said many important discoveries had been made in toxicology; one of which was that all decomposing organic matter develops poisonous alkaloids called ptomaines. In the decay of milk, a peculiar ptomaine is developed and this poison is always the cause of cholera infantum. Every one should be very careful how he or she uses any food which is in a state of decay. In selecting mushrooms for table use, one can safely adopt this rule: every *good* mushroom has a pleasing odor and an agreeable taste. The speaker said that he would be perfectly willing to eat any unknown mushroom, which had no offensive odor, nor an acrid, bitter, or otherwise disagreeable taste.

Mr. Kinney approved Professor Markoe's statements respecting the characteristics of good mushrooms.

Professor Markoe added that we obtain many valuable substances from poisonous plants. The so-called Poison Hemlock *(Conium maculatum)* yields, from leaves and seeds, a narcotic poison which is much used as a sedative and antispasimodc

medicine; and our well-known Tapioca is prepared from the roots or tubers of the Cassava plant *(Jatropha manihot)* although the sap of the plant contains hydrocyanic acid. But in the preparation of tapioca, the heat employed expels the poisonous element. It is a curious fact, that, in Russia, the above mentioned poison hemlock, is eaten with impunity by sheep and goats.

MEETING FOR LECTURE AND DISCUSSION.

SATURDAY, March 30, 1895.

A Meeting for Lecture and Discussion was holden at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair.

COMMERCIAL FERTILIZERS IN HORTICULTURE.

By Professor W. H. JORDAN, Director of the Maine State College Agricultural Experiment Station.

Statistics tell us that in 1892 the farmers of the United States purchased 1,500,000 tons of commercial fertilizers at a total cost of $53,000,000. It goes without saying then, that my subject today is an important one. It is also a difficult one. I am often moved to declare, at those times when my thought is concentrated upon its complexities and ramifications, that it is, all things considered, the most unsatisfactory of themes for discussion before a body of practical men.

A very large percentage of the inquiries that come to me as a Station Director, pertain to commercial fertilizers, and to some of these questions I can give immediate and definite replies. But when some farmer interrogates me after this fashion: "What is the best commercial fertilizer sold in the state?" or "What fertilizer should I purchase to use in growing potatoes?" or "Do you regard John Doe's Potato Fertilizer as preferable to James Roe's Potato Manure?" both my regard for the ofttimes sensitive feelings of the fertilizer manufacturer, and my pride in my reputation as one who would like to be called a sound adviser, lead me to return evasive or very general replies. Definite and unmodified replies would be injurious both to my reputation and to the best welfare of the inquirer. Before you today, then, you may expect me to treat this subject in a somewhat general manner.

Two facts handicap a discussion of certain special questions that relate to this subject as viewed from the standpoint of the horticulturist.

First. There is a dearth of exact knowledge that can be universally applied to the use of commercial fertilizers. We have many theories, opinions, and think so's, but altogether too few demonstrations.

Second. There is a perplexing complexity and variation of conditions under which different men are working.

When I first began to cast about in my mind for the lines of thought which I would discuss here today, these two topics at once presented themselves:

First. Fertilizers that we may safely regard as "specifics" for particular crops.

Second. The composition of fertilizers in its relation to the quality of the product.

These two topics are today in the forefront of active thought pertaining to plant nutrition, and it would give me great pleasure at this time to incorporate into a creed of practice well demonstrated facts bearing upon these important considerations. When, however, I came to turn over the records of experimental work upon the relation of different compounds and mixtures of compounds to the development and quality of vegetables and fruits, I found such an absence of data, such conflicting testimony, and, in general, such an unsatisfactory condition of statement, that a decision was at once reached that I would not come here and talk about hypotheses or half-demonstrated theories. There are, however, certain general remarks that with your indulgence I will make in this connection.

In the first place, I am somewhat skeptical in the matter of "specifics" in plant nutrition, at least so far as quantity of product is concerned. It is true that the needs of all plants for food are not just the same, because both the relative and absolute quantities of ingredients that they take up differ, and because some plants thrive with a food supply to which others are more or less indifferent. If by "specific" manuring we mean the supplying of a particular plant with its needed food elements in acceptable forms, so that it will make rapid and generous growth, I have no exception to take to the term, but I hold that the "*needed food elements*" and the "*acceptable forms*" are too

nearly the same for a large proportion of the crops that enter into intensive agriculture to allow any very narrow use of the term specific.

The specific thing to do is to feed the plant generously with what it needs.

I can illustrate my thought no better perhaps, than by referring to the experiments from the results of which the public, at least, has come to believe that nitrate of soda is a specific for tomatoes. These experiments were conducted mostly at the New Jersey and New York (Cornell) Experiment Stations, and upon consulting the conclusions drawn by the experimenters, I find that while nitrate of soda has in some cases a greater influence when used alone than any other single fertilizer, such statements as these are made: First. "Neither nitrate of soda nor muriate of potash alone are profitable tomato manures upon thin soil." (Cornell Bul. 21.) Second. "That the best effect is secured from manuring with nitrate of soda when there is in the soil a sufficiency of the mineral elements phosphoric acid and potash. (N. J. Bul. 63.)" Third. "These conclusions . . . show that *financial profits* from the use of nitrate of soda are also governed by the *quantity applied*, the *method of application* and a *full supply in the soil of the mineral elements.* (N. J. Bul. 79)." What other meaning can be given to these conclusions than this,— that when tomatoes are abundantly supplied with all other elements of growth save nitrogen, the addition of nitrate of soda, containing nitrogen combined as nitric acid (all things considered its most efficient form), greatly promotes growth and vigor. Of very many, if not nearly all, of our cultivated plants, can the same thing be said. Nitrate of soda is a great and almost universal specific for furnishing available nitrogen to crops, as a wide experience shows. That it is peculiarly so for tomatoes or any other small list of cultivated plants I seriously question.

My point is this: Cultivated plants require the same elements of plant food, though in somewhat variable proportions. These elements are found in certain compounds which are very generally useful in plant nutrition. When a crop grower uses one or more of these compounds to supplement his otherwise available supply of plant food so as to secure intensive growth, that compound is for him a "specific" for his conditions.

Turning now, in the second place, to the influence of the composition of the fertilizer upon the product, we enter a field of far too scanty knowledge, and in regard to the information which we have, I freely confess that to me it does not have a desirable definiteness and conclusiveness. Nor is this strange. Quality in vegetables and fruits is dependent upon so many conditions, such as climate, season, the fertility of the soil, rapidity of growth, and manner of handling, that it is difficult to trace the relation between a single cause and its effect. There appears to be no theoretical reason why a vegetable or a fruit may not be materially modified by varying the kind and quantity of its food supply, and, indeed, there are well established examples of this nature. The increased ash content of plants through a liberal supply of easily available mineral food; the greater albuminoid content in certain grasses due to heavy feeding with soluble nitrogen salts; the effect, in certain instances at least, of potassium chloride upon the starch content of the potato; the influence of the proportion of nitrogen to phosphoric acid and potash compounds in fertilizers upon the sugar content of beets; the deterioration of the burning quality of the tobacco leaf because of the influence of muriate of potash in the fertilizer,— are all instances, well enough proven, of favorable or unfavorable results from the manner of feeding the plant. It is entirely reasonable to suppose that the sweetness or acidity of fruits, or the flavor of certain vegetables, may be modified in ways we do not now understand, by the kind and quality of food supplied. Here is a field for continued and painstaking work on the part of investigators in experiment stations.

It appears to me quite certain, however, that much of the influence supposed to be due to the fertilizer is of an indirect rather than a direct nature. I regard the sugar beet as an illustration of this. It does not appear that the depression of the per cent of sugar caused by heavy applications of animal manures, or by an excessive use of nitrogen salts, is due to a direct antagonism of the nitrogen compounds to sugar formation, but rather to the fact that the abundant supply of nitrogenous compounds so intensifies and prolongs the growth of the beets as to prevent the production of the large sugar content which occurs at maturity. So with other vegetables, the rate of growth and the degree of maturity within a given time are important in rela-

tion to quality, and these conditions are controlled in part by the fertilizer used.

But I feel quite sure that what I have said so far you would characterize as consisting of somewhat broad generalizations, so indefinite as to be devoid of much in the way of practical suggestions. Let us, therefore, turn to a side of our subject, which admits of discussion on a safe and well established basis. And I notice, first of all, that stable manure is the main reliance with the horticulturist, especially in forcing house and market garden work. This will doubtless always be the case for several reasons.

First. The organic matter of these manures gives a physical condition which, in its relations to heat and moisture is more favorable to plant growth than can be obtained in any other way.

Second. Such manures cause a soil to become a hotbed of chemical activity.

Third. Animal manures, generally speaking, are a fairly complete and well balanced source of plant food.

We may safely assume then that, in vegetable growing at least, commercial fertilizers will be used principally as a supplement to stable manure. It is with this fact in mind, then, that we will continue our discussion of this subject.

We are now considering commercial plant food,— that which must be purchased,— the nitrogen of which will cost upwards of twenty cents per pound, the available phosphoric acid, seven cents, and the potash five to six cents, when landed where they are to be used. How shall this plant food be purchased, and in what forms? Are the ordinary superphosphates, or even the so-called special manures in the markets, a desirable source of plant food for the horticulturist?

And I remark as a general proposition that the agriculturist, and the horticulturist in particular, can do better than to depend upon the ordinary brands of superphosphates or mixed fertilizers, as at present manufactured, for his commercial supply of plant food. This statement is not offered as a general criticism upon fertilizer manufacturers or upon their goods. While I am not satisfied with the existing conditions of our fertilizer trade in its relation to any class of crop producers, there is no element of blame attaching to either the honorable manufacturer or the farmer. They are both very much the victims of circumstances. The trade has grown into its present means and methods

gradually, molded by competition, the necessity for profit, the relative cheapness of materials, conditions of intelligence or ignorance upon the part of consumers, and, to some extent, by prevailing notions in the scientific world.

Unfortunately, however, (and I say this out of a dozen or more years of experience as an inspector of fertilizers) it is the minority of fertilizer manufacturers who are making a study of the real needs of agriculture so as to meet these needs with the right amount of the best materials. Too many of them are dealing upon the ephemeral basis of selling the least value in plant food, for the biggest price that competition will allow, rather than upon the more enduring foundation of supplying the most useful compounds for plant nutrition in the right proportions. The methods that govern the patent medicine trade have entered too largely into the fertilizer trade. It is too often a matter of skillful advertising, or the canvassing of a shrewd, tonguey agent, rather than a consideration of the real needs of the consumer. The horticulturist, at least, should stand outside these unfortunate conditions, for he, as a rule, is a man who is intelligently studying his business.

In order to get at this matter more in detail, let us consider briefly what fertilizers are and the sources of the materials that enter into them.

The superphosphates of the trade are, as you well know, mostly mixtures, in varying proportions, of three classes of compounds, — those containing nitrogen, phosphates of various kinds, and potash salts. The leading ingredient in the matter of quantity is phosphoric acid, potash standing next in order.

The principal sources of phosphoric acid are bone in its various forms,— raw, steamed, dissolved bone and dissolved bone black, South Carolina and Florida rock phosphates both crude and dissolved, phosphatic guanos, etc. In all these substances the phosphoric acid is combined chiefly with calcium oxide or lime, although one material which is made up mostly of phosphates of iron and aluminum has recently come into some prominence. The availability of phosphoric acid in these several sources of supply is the main point for consideration, and I have this to say, that in so far as it is rendered water-soluble its value is uniform whatever its source. The so-called "reverted" or "citrate soluble" phosphoric acid must also have a practically uniform

value when it consists of phosphate of lime that is truly "reverted," but there are other compounds which are dissolved by ammonium citrate to which the term available should, in my judgment, be applied with caution. Let me explain.

We have recently erected at the Maine Experiment Station a forcing house for the study of certain problems in plant nutrition. For two years we have been investigating the foraging power of a variety of plants for phosphoric acid as obtained from different sources, and among other materials entering into our work is one somewhat peculiar. It is made up of phosphates of iron and aluminum, which in their natural condition were hydrates and insoluble in the citrate solution, but which by the application of heat are rendered anhydrous and soluble in ammonium citrate, though not in water. In the parlance of fertilizer analysis this phosphoric acid is therefore styled reverted and available. The fact is. however (and this is a sad comment on the citrate method for determining the real availability of phosphoric acid), the phosphoric acid in this form does not prove to be highly available, at least under the conditions of our experiments, except in the case of turnips. In our experiments clover, peas, barley, corn, potatoes and tomatoes have not been able, under forcing house conditions, to feed from it readily, whereas, in the case of the clover and peas at least, floats from Florida rock, very little of the phosphoric acid of which is dissolved in the citrate solution, have proven more useful.

The important point in this connection is this: these anhydrous phosphates of iron and aluminum are being used to increase the per cent of so-called available phosphoric acid in some of our mixed fertilizers. To this fact in its relation to the forcing house and the market garden, I shall refer later.

The potash salts imported from Germany are the almost exclusive source of potash in our mixed fertilizers. We have three of these compounds, the chloride or muriate, the sulphate, and lately the carbonate, all of which are soluble in water, and which, for general agricultural uses, we may regard as practically equal in value, and probably so for the special uses of the horticulturist. Commercially the sulphate is more valuable than the muriate.

The commercial sources of nitrogen are greater in number and more varied in character than is the case with either phosphoric acid or potash. No plant-food problem, either commercially or

in practice, demands more careful consideration than does the nitrogen supply.

First. The element is expensive, for it costs nearly three times what the other two do.

Second. It is subject to greater possibilities of waste than any other commercial element of plant food.

Third. It may be, and is, derived in part from inferior sources.

The third and last statement is the one with which we are mainly concerned in today's discussion.

The nitrogen of fertilizers is found to be combined in three general forms, viz.: in nitric acid or nitrates, in ammonia or ammonium salts, and in vegetable and animal substances, which as a class are called organic ammoniates. The only representative of the first class, which enters into the fertilizer trade is nitrate of soda. In this we have the nitrogen as nitric acid, the form adapted *par excellence* for the uses of the plant. We have reason to believe that nitrogen enters the plant largely in this combination, and that other forms are to a great extent changed to this before becoming useful.

Standing next to nitrates in point of value, and perhaps scarcely below, are the ammonium compounds, sulphate of ammonia being the only one entering into the list of fertilizer supplies. This is the most concentrated nitrogenous fertilizer we have, and even though its nitrogen may suffer conversion into nitric acid wholly or in part before being utilized, it takes a place second to nitrate of soda, if at all, only upon theoretical grounds, for in practice it is found to act with entire promptness and efficiency in promoting growth.

When now we come to a consideration of the organic ammoniates actually found in the markets, it is not possible to speak of them all in terms of approval. A fairly complete list of these ammoniates are the following: Dried blood, dried meat, tankage (which may be varied in character and may cover a multitude of sins), ground bone, dried fish, fish scrap, hoof and horn meal, waste hair, waste meal, leather, cotton seed meal, and castor pomace.

These materials are classified as to agricultural value according to their availability, or the readiness with which the nitrogen is carried over (through processes of fermentation and decay) into compounds which the plant can utilize. Judging from this standpoint those organic ammoniates which should be ranked as

desirable are dried blood, dried meat, tankage (consisting of meat and bone), dried fish, cotton seed meal, and castor pomace. I am not ready to place hoof and horn meal in the afore mentioned list, neither shall I include it with certain kinds of tankage, wool waste, hair waste, and leather, which are inferior and should be regarded as frauds in any fertilizer that is put forward for one of good quality.

But you ask, Are these inferior ammoniates, these frauds, actually used in the manufacture of fertilizers? There is credible evidence that they are. Some one now inquires, Are they found in the fertilizers which I buy? That depends. Unquestionably they are bought by somebody, otherwise they would not be manufactured, but whether you buy them or not I am not able to say. Unfortunately if you were to put a sample of the fertilizer you have purchased into the hands of the chemist, he could not answer your question with any degree of certainty.

Doubtless these statements will be regarded as a serious indictment of the fertilizer trade. I do not mean to imply, however, that all brands of fertilizer contain these inferior materials, or to disguise the fact that a vast amount of the best of organic material is mixed into the various brands of superphosphates. I do mean to call attention, though, to the possibilities of purchasing nitrogen unfit for the uses of the horticulturist who is seeking rapid growth and quick returns. Whatever may be said of grass and grain farming, the forcing house and market garden are no place for compounds so inert that they must undergo a long process of "weathering" before becoming useful, and whose purchase in the place of better materials may cause the partial loss of a season's opportunity. The producer of fine vegetables for the city market needs his plant food in forms easily available at once, especially that part of it which he purchases as a supplement to stable manure in order to secure the earliest possible growth.

It is very easy for us to perceive, in the light of these facts, that it is very important, for the horticulturist especially, to adopt such methods of dealing as shall insure the purchase of the right kind of plant food. What shall these methods be? While affirming that the advertised brands of fertilizers furnish, in a certain percentage of cases, which may be greater or less, plant food of the very best quality, I will offer for your consideration two

methods, the adoption of either of which would in my judgment constitute a progressive step.

First. Home mixing of chemicals.

Second. An order to a manufacturer in whom you have entire confidence, for a mixture of chemicals which you shall specify. Either of these methods gives an opportunity to select materials, the quality of which is known, with a good degree of assurance. Nitrate of soda and sulphate of ammonia may be adulterated, but when taken in an unmixed condition, the value and extent of the adulterations are easily detected. Dried blood and dried and ground meat, each possesses a somewhat characteristic appearance, an important variation from which attracts attention. Tankage, to be sure, may, if purchased, still give an opportunity for deception, but if it can be inspected as such, the presence of wool and hair waste and leather are much more easily discovered, than when mixed with the larger bulk of phosphatic and potash materials, associated with it in mixed fertilizers.

The nature of phosphoric acid compounds may also be known when purchased as a plain superphosphate. Dissolved bone black and acid phosphates are easily recognizable by their physical appearance, but if not, chemistry is perfectly competent to determine whether they contain any compounds of questionable value. In fact, when a plain superphosphate is bought on a guarantee there is very little reason to expect any deception as to the amount and quality of the phosphoric acid obtained. Certainly in this way it is possible to avoid the unwitting use of these phosphates of iron and alumina of which I have made previous mention, and which we must now regard as undesirable for use in forcing the growth of vegetables.

I urge upon the horticulturist then, some method of buying his plant food that will allow him to select it with reference to its quality. Why shall he not do this? The dairyman is very particular about the quality of his animal foods, and why should not the plant feeder be equally careful. Fertilizers cost more per ton than bran or meal, and a season's opportunity in vegetable production is worth as much as cows, milk, and butter. You cannot deceive the plant any more than you can the cow. The cow and plant alike refuse to yield generous returns without proper nourishment, and so I am unable to understand why plant food should not be obtained in ways that admit of the same close inspection of materials as is the case in the cattle food trade.

There is another reason why I would not buy the ordinary brands of superphosphates, as a supply of plant food for the forcing house and market garden, viz.: The three ingredients, nitrogen, phosphoric acid, and potash are not combined in the right proportion for use under these conditions. Not long ago I took occasion to ascertain the proportion of nitrogen to available phosphoric acid and potash soluble in water in fifty-eight brands of fertilizers sold in Maine. I found that for each 100 pounds of nitrogen these goods contained on the average 460 pounds of available phosphoric acid and 120 pounds of potash. These proportions are very different from those existing in the quick growing food plants most common to horticulture. I find that the average proportions in twelve of the most important vegetables is, nitrogen 100, phosphoric acid 50, and potash 160. This shows that in the average fertilizer the ratio of phosphoric acid to nitrogen is nine times greater than it is in the average of twelve vegetables. The ratio existing between the nitrogen and potash is not greatly different in the two cases. This means then, that if the fertilizer is to correspond to what the plant uses it must be compounded quite differently from the average formula found in the market: in no case, out of the fifty-eight fertilizers examined, did I find a ratio of nitrogen to phosphoric acid greater than one to two, which would give a proportion four times less than in the crops distinctively horticultural.

But should a fertilizer contain the elements of plant food in the same relative proportions that they are found in the plant? Perhaps never just the same — perhaps sometimes very widely different — but the degree of approximation to this must depend upon circumstances. It is true in the abstract that a crop grower purchases plant food most wisely when he buys just enough of certain ingredients to make good the deficiencies of his home resources. What those deficiencies are is determined by several factors, the important ones being the soil, the crops grown in the rotation, and the kind and quantity of products sold. I would never advise the general farmer to adopt as a principle of action special fertilizers whose formulas are based wholly upon the composition of the crops he is to produce, for to do this is to ignore the greatly varying capacities of soils, the unlike feeding power of different plants, the use of legumes as a source of nitrogen supply,—is to ignore, indeed, all but one of those factors

which determine the farmer's plant food deficiencies. For certain farmers in the Connecticut Valley, whose alluvial soils cry out for potash, to buy the same fixed formula as the Maine farmer, whose granitic soil is, by the processes of weathering, yielding its annual quota of available potash, or for the grain producer, whose environment admits of the successful use of clover in the rotation, to purchase as much nitrogen as the farmer located where clover does not thrive, is to adopt a "rule of thumb" method that does not belong to the highest order of farm management. I grant, yes, I do more than this, I assert, that with the horticulturist, who is engaged in intensive production, the case is different. In the forcing house and garden, conditions are almost if not entirely artificial, so far as it is a question of feeding the plant. Even in the garden, the variations in the natural food supply are obscured by the greater amount of available material supplied by the generous applications of stable and commercial manures. While we must still depend to an extent upon the chemical activities whose field of action is the rich garden loam and the artificial soil of the forcing house, we are comparatively independent of those processes of weathering which are of so much importance as a means of fertility in the long rotations of the grass and grain farm. In the production of grass, grain, and even the ordinary hoed crops, the natural capacity of the soil, or its annual contribution of available plant food is an important, and even a controlling, factor; but in certain lines of horticultural work it is a minor factor. In horticulture and the forcing of vegetables, the plant is the one thing to be considered, and after we have made the physical conditions and water supply what they should be, we may safely proceed to feed the plant as if its sole supply of nourishment is what we furnish it.

The considerations stated in the foregoing lead me to the conviction then that the fertilizers ordinarily found in the markets are not economically adapted to certain lines of horticultural work. The proportions of ingredients in these goods is such that it is necessary to purchase too much of one in order to obtain enough of others. For use under the conditions to which I have so far confined this discussion, I am convinced that on the average the amount of phosphoric acid used should at least not be in excess of either the nitrogen or potash, or, in other words, for market garden and forcing house use, the proportions of

nitrogen and potash should be greater than is found in the established brands of mixed fertilizers now offered in the market.

This desirable change can be secured, as I have already indicated, by the purchase of chemicals to be mixed at home, or by coöperating with some manufacturer in whom you have confidence. Under right conditions either method may be successful. It would be foolish to ignore the manufacturer, because the wisdom of a division of labor holds good here as elsewhere. But we should keep him in his place, which is to supply us with what we wish to purchase, without even supposing that he can determine our needs. These we must discover for ourselves, aided by the investigations and results of others. There has been too much of a feeling on the part of the agricultural public, that somehow or other the manufacturer is able to discern the needs of farmers, because of a higher range of knowledge to which he has access; that somehow or other the same knowledge enables him so to conjure with materials obtained from unusual sources that he is bound to offer, if not the right thing, a very good thing, which rises above the common everyday facts and means of agricultural practice.

The crop grower should never forget that the manufacturer is studying commercial opportunities chiefly, and that he is first of all a business man, and is rarely competent either from the practical or scientific standpoint to guide in the practice of plant feeding. His province is to study the markets and processes of manufacture, and in these directions he must lead; but in respect to the use of plant food the farmer should lead, and the manufacturer should buy and manipulate to suit the demand that comes up to him from the consumer.

Commercial fertilizers, as they exist in the markets today, are a curious medley. In their composition the fact is recognized that nitrogen, phosphoric acid, and potash, are the three constituents of plant food, one or more of which is likely to be needed to increase fertility; but beyond this they fail in most instances to embody any distinct principle or rule of practice. The so-called special manures of different manufactures, designed for the same crop, differ almost as widely as do the brands designed for general use. Order will sometime come out of this chaos, but chiefly through the efforts of those who use the various preparations of plant food. This will not be done, however, until trade names pass

into "innocuous desuetude," and plant food in its various forms, is both bought and sold by the names it properly bears, as one buys and sells sugar, iron, or any other standard commodity. And the time is coming when the general farmer, or the market gardener, will order of the dealer so many pounds each of nitrogen, phosphoric acid, and potash, just as now he purchases seeds and foods.

As a suggestion to those, especially market gardeners and those managing forcing houses, who are inclined to mix their own fertilizers or to ask for a definite mixture from the dealer, I offer the following combinations, which may be varied *ad libitum*.

(1)

Nitrate of soda	15 per cent nitrogen	350 lbs.
Dried Blood	10 " "	700 "
	2 " phosphoric acid	
Acid Phosphate	15 " " "	700 "
Sulphate of Potash	50 " potash	250 "

This combination would contain the following:

Nitrogen	122 lbs. or 6.1 per cent.
Phosphoric acid	119 " " 5.9 "
Potash	125 " " 6.2 "

(2)

Sulphate of Ammonia	20 per cent nitrogen	250 lbs.
Cotton seed meal	6.75 " "	1000 "
	2.75 " phosphoric acid	
	1.75 " potash	
Acid Phosphate	15 " phosphoric acid	550 "
Muriate of Potash	50 " potash	200 "

This combination would contain the following:

Nitrogen	117 lbs. or 5.85 per cent.
Phosphoric Acid	110 " " 5.5 "
Potash	117 " " 5.85 "

(3)

Nitrate of Soda	15 per cent nitrogen	300 lbs.
Dried Blood	10 " "	600 "
	2 " phosphoric acid	
Dissolved Bone	14 " " "	800 "
	2.5 " nitrogen	
Sulphate of Potash	50 " potash	300 "

This combination would contain the following:

Nitrogen	125 lbs. or 6.25 per cent.
Phosphoric acid	124 " " 6.2 "
Potash	150 " " 7.5 "

Special attention is called to mixture No. 2, which, owing to the low price of cotton-seed meal, would furnish plant food more cheaply than either of the other combinations.

It is very easy to see that by varying the quantities of chemicals the mixture may be made to contain more of one ingredient and less of others.

Just here the question will arise,— "How shall I know what combination to use?" Only by observation and study. You should not adopt the successful rule of practice of some other man unless your conditions are entirely similar to his. And the only method admitting of intelligent and reliable observation is when fertilizing materials are applied with a full understanding of what they contain, so that it is possible to trace cause and effect. If you purchase these ingredients separately, you are then able to apply them singly, or combined in different forms and in different proportions. In this way you may attain a degree of knowledge applicable to your own business that will never be possible if you continue to buy the fixed formulas of the markets. This may be a hard doctrine, but it is nevertheless the means of salvation.

The agricultural public should study carefully the results of experiment station investigations, for in this way much will be learned, which, as general principles, will be important to every man's practice. But never will experiment stations relieve the individual of the necessity of making a close study of the needs and methods of his own environment.

Principles, the practitioner may be taught by others,— the right relation of the principles to his own business he must, in part at least, discover for himself, and in no field is there a larger opportunity for this than in the purchase and use of commercial fertilizers.

Discussion.

A gentleman remarked that some persons not familiar with plant culture regard all commercial fertilizers as similar in character to alcohol,— as only stimulants. But the truth is they are really plant food — as positively so as any stable manure. This has been proved by many careful experiments, including those by sand culture and water culture. As no healthy child could be reared on alcohol, so no plant life can be long sustained without being supplied with plant food.

William C. Strong asked whether the phosphates of iron and aluminum were undesirable.

Professor Jordan replied that for the horticulturist they are; as in his cultural work he had found their action to be too slow. But in farming operations, especially on land about to be laid down to grass, they may be valuable for their staying qualities, as they require much of "Nature's weathering" to develop their useful conditions.

Benjamin P. Ware asked what was meant by the terms "available" and "reverted" phosphoric acid.

Professor Jordan answered that those expressions represent an important fact. Available phosphoric acid — if such in reality — is that which can be rapidly taken up by growing plants. The term "available," as used in connection with fertilizer analysis, means the sum of the water-soluble and reverted (or citrate-soluble). "Reverted" should really be applied only to "that which has once been soluble in water, but by chemical change has gone back;" but is now used in the sense of "that which is soluble in ammonium citrate."

The question was asked, What is the relative value of wool-waste and hair-waste as compared with other materials in commercial fertilizers?

Professor Jordan replied that although rich in nitrogen, both are very slow to yield their fertilizing elements, unless they are broken down by chemical treatment or some process other than Nature's weathering; even then there are other sources which are preferable for the horticulturist. Cotton-seed meal, for this purpose, is this year sold in Maine at twenty dollars per ton. This yields six and three-fourths per cent of nitrogen; two and three-fourths per cent of phosphoric acid, and one and three-fourths per cent of potash. At the price named one can now get a supply of nitrogen from cotton-seed meal more cheaply than from any other source. (In the first two formulas given in the paper read today, the term acid phosphate refers to Florida rock, South Carolina rock, or bone-black, each in a dissolved state.)

The next question asked was, What fertilizing elements are derived from bones? To this Professor Jordan replied that bone furnishes phosphoric acid and nitrogen. If bones are steamed, that process takes away a portion of the nitrogenous matter, thus reducing the proportion of nitrogen in the fertilizer.

Mr. Ware expressed his delight that the essayist had given so outspoken a talk upon commercial fertilizers. Public speakers generally seem to be a little delicate about speaking their mind on this subject, out of regard for the feelings of manufacturers. The milkman who is wise supplies his cows with well balanced rations. All cultivated crops, to make the best growth, require well balanced rations as much as cattle. The soil of Massachusetts is generally deficient in potash, but the manufacturers of commercial fertilizers persist in putting on the market compounds that are made up of materials in wrong proportions — too much phosphoric acid and too little potash. Why should not our farmers and horticulturists purchase the ingredients which are needed in their soils and mix them on their own premises, in the proportions required in each case? All the conveniences necessary for this work are a barn-floor, a shovel, and a man; and proper mixing can be done for fifty cents per ton. Last year the speaker purchased his own selection of ingredients for what would be equivalent to ten tons of mixed fertilizers of which the price was forty dollars per ton; but he paid only about one-half the cost of so-called complete fertilizers. By following this plan one gets what he needs with no useless surplus, and will save at least one-third of the cost of an unknown mixture. In the paper read here today, Professor Jordan has touched upon one of the most important subjects to all who cultivate the soil; he has spoken the truth, openly and fearlessly, and it has been a great satisfaction to hear him state the facts.

Professor Jordan thanked Mr. Ware for so heartily indorsing his statements. He then said he wished to leave upon the minds of all present, this distinct impression: he would have a method of mixing fertilizing compounds with special regards for the needs of the different localities where they were to be used. If cultivating wheat in Pennsylvania, he would not buy so much nitrogen, because in the rotation of crops, clover would furnish that. But he would especially have regard paid to the requirements of market gardeners and forcing house men, whose soils are in so artificial a condition, that the gardeners practically furnish all the plant food their crops get or require. In such case the culturist needs to know what ingredients are necessary for each crop, and the relative proportions of each. He cannot find such mixtures in the market. His only course then, is to buy the

several materials and mix them himself, or, place an order for such mixtures with a reliable manufacturer. Professor Jordan stated that at present the manufacturer dictates to the farmer what he shall purchase, whereas the reverse should be true.

The question was then asked, What is the relative value of the liquid manure, and the solid product from stables?

Professor Jordan had no doubt that the loss, by the waste of the liquid manure of stables, was in many localities fully equal to the amount paid for artificial fertilizers. He believed that where the animals were well fed, the liquid manure constituted one-half or more of the commercial value of the whole product; but this valuable material is, by many farmers, allowed to run to waste.

To a question concerning the value of sulphate of ammonia, Professor Jordan replied that he regarded it with favor. It contains about twenty per cent of nitrogen. It is less likely to leach rapidly from the soil than nitrate of soda, and is sufficiently available for quick growing crops.

The question was asked, How does gas-lime rank as fertilizing material? In answer Professor Jordan said that when first received from the gas works, it consists chiefly of lime, with some addition of the sulphate, the sulphite, and the sulphide of lime; the last named, especially, is poisonous to vegetation, but if exposed a while in the open air, the poisonous properties disappear. The remaining lime, if put into the soil is of use by its chemical action upon inert matter there present, converting it into plant food.

In reply to a question whether potash is a necessary element of plant food, Professor Jordan said that if there is anything pretty well proven, it is that plants must have potash. Plants undoubtedly contain some potash which is in excess of a minimum portion that is absolutely essential. There is a minimum which plants must have, and which no other compound can replace.

CONTENTS.

PAGE

PREFATORY NOTE, ... 3

BUSINESS MEETING, January 5, 1895; Address of President Kidder, pp. 5, 6; Appropriations for 1895, pp. 6, 7; Appointment of Treasurer and Secretary, 7; Appropriation for William Castleton, 7; Report, inexpedient, on Lectures by W. H. Gibson, 7; Committee on School Gardens and Children's Herbariums, 7; Announcements by Committee on Publication, 8; Report of Chairman of Committee on Gardens, 8; Committee on Board of Trustees, 8; Report of Committee on Revision of the Constitution and By-Laws, 8, 9; Two members elected, ... 9

MEETING FOR LECTURE AND DISCUSSION, January 12; Days with our Birds, by Mrs. Kate Tryon, ... 9–13

MEETING FOR LECTURE AND DISCUSSION, January 19; Flower Pots, by A. H. Hews, pp. 14–21; Discussion, ... 22

MEETING FOR LECTURE AND DISCUSSION, January 26; Fungous Diseases of Ornamental Plants, by Byron D. Halsted, with three plates, pp. 22–33; Discussion, ... 34, 35

BUSINESS MEETING, February 2; Annual Report of Treasurer read, p. 35; Supplementary Report from Committee on School Gardens, etc., 35; Report of Committee on Large, Old, or Interesting Trees, with volume presented, 35, 36; Vacancy in Committee on School Gardens, etc., filled, 36; Committee on Board of Trustees, 36; Six members elected, 36

MEETING FOR LECTURE AND DISCUSSION; Hardy Plants and Shrubs, by J. Wilkinson Elliott, pp. 36–53; Discussion, ... 53, 54

MEETING FOR LECTURE AND DISCUSSION, February 9; Glass Houses, by Henry W. Gibbons, with two plates, pp. 55–74; Discussion, ... 74, 75

MEETING FOR LECTURE AND DISCUSSION, February 16; Economic Entomology, by Edmund B. Southwick, pp. 76–82; Discussion, ... 82–85

MEETING FOR LECTURE AND DISCUSSION, February 23; Experimental Evolution Amongst Plants, by Prof. L. H. Bailey, pp. 86–99; Discussion, . 99, 100

BUSINESS MEETING, March 2; Contributions to Memorial to Francis Parkman, pp. 100, 101; Decease of J. J. Thomas and F. B. Hayes announced, 101; three members elected, ... 101

MEETING FOR LECTURE AND DISCUSSION; A Talk on Gardens, by David Hill Coolidge, Jr., pp. 101–114; Discussion, ... 114, 115

MEETING FOR LECTURE AND DISCUSSION, March 9; Budding and Grafting, by Jackson Dawson, pp. 115–136; Discussion, ... 136

MEETING FOR LECTURE AND DISCUSSION, March 16; Some Notes on Tomatoes, by Prof. W. M. Munson, pp. 136–146; Discussion, ... 146–148

MEETING FOR LECTURE AND DISCUSSION, March 23; Edible Native Fungi, by Hon. John M. Kinney, pp. 149–156; Discussion, ... 156–158

MEETING FOR LECTURE AND DISCUSSION, March 30; Commercial Fertilizers in Horticulture, by Prof. W. H. Jordan, pp. 158–172; Discussion, . . 172–175

Experiment Station Reports Wanted.

The Massachusetts Horticultural Society is endeavoring to collect complete sets of the Bulletins and other publications of all the Agricultural Experiment Stations in the United States and Canada. Those named below are wanting, and any person having a spare copy will confer a favor by addressing the Librarian of the Society, Horticultural Hall, No. 101 Tremont Street, Boston.

Alabama (Ag. and Mech. College Station).—Bulletins 4–6 (1884), 7–10 and 1–4 (1885), 5–9 (1886).

Alabama (Canebrake Station).—All Annual Reports later than that for 1890.

Arizona.—All Annual Reports later than the Second, for 1891–92.

Arkansas.—Bulletin 1. All Annual Reports later than the Fourth, for 1891.

California.—Bulletins 32, 1878, and 1, 2, 3, 5, and 50, new series.

Colorado.—Bulletin 3.

Connecticut (New Haven Station).—Bulletins 1 to 67, inclusive. Annual Reports for 1877 to 1883, inclusive, except that for 1878.

Idaho.—All Bulletins later than No. 9.

Indiana (Purdue Univ. School of Ag.).—Bulletin 1. College Reports 1 to 14, inclusive.

Kentucky.—Bulletin 10.

Maryland.—Special Bulletins G and K.

Missouri.—Bulletins 9, 13, 15, 16, 19, 20, 25, 26, and 33 of the Old Series. All Annual Reports since the First, for 1888.

New Hampshire.—3d and 4th Annual Reports.

New Jersey.—Bulletins 1, 4, 5, 15, 27, and 28.

New York (Cornell).—Annual Report, 1882–83 (Report of Agricultural Department of Cornell University).

North Carolina.—Bulletins 1 to 56, inclusive, and 69, 2d ed. Meteorological Division, Bulletin 2 (68*b*), and 2d and 3d Annual Reports, for 1888 and 1889. Special Bulletins 1 (77*a*) and 4 (82*a*). Weekly Weather Crop Bulletins 1–21, 1888; 1–24, 1889; 1–25, 1890; 2 and 4, 1891.

Ohio.—All Bulletins of the First Series, except 16, 17, 18, and 19.

Oregon.—All Annual Reports later than the Third for 1890–91.

Pennsylvania.—Annual Reports for 1869, 1872, 1879–80, 1881, 1882, 1883 and 1884. [All issued by the State College.]

South Carolina.—All Bulletins of the Old Series (previous to 1888) on the work of the Experimental Farm of the South Carolina College. Third Annual Report, for 1890, and Sixth Annual Report, for 1893.

Tennessee.—Bulletin 1, 1884.

Texas.—College Bulletins 1–5, 1883–1887.

West Virginia.—Special Bulletin,—Potash and Paying Crops, 1890. All Annual Reports later than the Third, for 1890.

Ontario Department of Agriculture, Toronto. Bureau of Industries.—Agricultural Returns to the Ontario Bureau of Industries, Nov., 1882 (5th), Aug., 1883 (7th), and Nov., 1887 (20th).

TRANSACTIONS

OF THE

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FOR THE YEAR 1895.

PART II.

BOSTON:
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1896.

☞ SEE LAST PAGE OF COVER.

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TRANSACTIONS

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Massachusetts Horticultural Society.

BUSINESS MEETING.

SATURDAY, April 6, 1895.

A duly notified Stated Meeting of the Society was holden at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair.

William C. Strong, Chairman of the Committee appointed at the last meeting to prepare a memorial of the late John J. Thomas, an Honorary Member of the Society, presented the following report:

REPORT OF THE COMMITTEE ON THE DEATH OF JOHN J. THOMAS.

It is not given to men engaged in the quiet industry of horticulture to arrest attention and startle the world by brilliant deeds or discoveries. The common lot with us is this, that we run our short race with average success, and then are gathered unto our fathers. Yet it is also true that such as these, who have with quiet faithfulness and marked ability acted well their part, have been of greatest service to mankind, and are entitled to lasting remembrance.

Such a man was John J. Thomas of Union Springs, N. Y., who ceased from his long life of earthly usefulness on the 22d of February last. Born in 1810, on the shore of the beautiful Cayuga Lake, in the heart of the great agricultural and horticultural Empire State, he identified himself with these interests at an early age, and soon took rank as a leader. In the year 1839 he became a regular contributor to the "Cultivator," published at

Albany, and upon the establishment of the "Country Gentleman" by Luther Tucker in 1853, he became associate editor, and held this important position for more than forty years, until compelled by ill health to resign in August last. During this long period he was unwearied in his writings, giving practical instructions in cultivation and suggestions as to buildings and farm machinery, with drawings from his own pencil, and replying to questions with unvarying patience and skill. During the same period he wrote "The American Fruit Culturist," a most comprehensive and authoritative work, which will be of enduring value; also a volume on "Farm Machinery," besides editing the nine volumes of "Rural Affairs," extending over twenty-seven years, their contents being indeed, chiefly from his pen and their many illustrations chiefly from his pencil. These writings were far from being the speculations of a theorist but rather were a record of the observation and experience of a man who came into actual contact with the soil. With him theory and practice went hand in hand. The smoothing-harrow, the pruning shears, the sliding gate, jarring of plum trees for the curculio, sanitary arrangements for outhouses, and a multitude of other methods which he devised, were all suggested by his own necessities as an extensive orchardist and nurseryman. It was for this reason that his opinions were regarded as of such practical value and were so constantly sought and prized.

It is not easy to estimate the wide influence which Mr. Thomas thus exerted throughout the country. But his interest was not limited to rural pursuits. His was a well-rounded character, active in all social, educational, moral, and religious questions of the day. With uniform kindliness, sterling integrity, and recognized sagacity, he gave expression to his views and widely influenced public opinion. When some great military captain is gone we recount his brilliant deeds of arms. When an eloquent statesman has run his course we magnify his masterly service. Shall we put a less value upon the work of him who in the quiet and unobtrusive walks of life has yet been a mighty power for good in all our wide land?

Mr. Thomas was elected an Honorary Member of the Massachusetts Horticultural Society in 1856. In the closing of this earthly life of our fellow-worker and friend this Society desires to express to his family its deep sympathy with them in their loss. May it not also join with them in grateful acknowledgment to the Author

of all being in the remembrance of the noble and useful life of our brother?

WILLIAM C. STRONG,
O. B. HADWEN,
ROBERT MANNING, } *Committee.*

The memorial was unanimously adopted.

The Annual Report of the Committee on Plants was read by the Secretary, accepted, and referred to the Committee on Publication.

The President, as Chairman of the Executive Committee reported from that Committee a recommendation that the Society appropriate $50 to defray the expense of the first volume of "Photographs and Descriptions of Old Trees of New England," prepared by the Committee on Large, Old, or Otherwise Interesting Trees. The appropriation was unanimously voted.

The amendments to the Constitution and By-Laws, ordered by a majority vote, at the Stated Meeting on the first Saturday in January, to be entered on the records, came up for further action. William C. Strong moved that the Constitution and By-Laws be taken up *de novo*, and be amended according to the report of the majority of the Committee on that subject, with certain changes which he proceeded to state. The majority report of the Committee on the Constitution and By-Laws, as thus amended, was read twice, and by a majority vote ordered to be entered on the records, and laid over for consideration at the Stated Meeting on the first Saturday in July. It was also voted that these proposed amendments be printed and distributed.

The following motion, offered by Leonard Thompson, was unanimously carried:

That the plan of the Rumford Historical Association in erecting a pillar marking the spot of the discovery of the Pecker, or, later named, Baldwin apple is approved as worthy by this Society.

The following named persons, having been recommended by the Executive Committee for membership in the Society were on ballot duly elected:

MRS. C. S. HATCH, of North Cambridge,
Professor JAMES F. BABCOCK, of Boston,
LIVINGSTON CUSHING, of Weston,
C. SIDNEY WALDO, of Jamaica Plain.

Upon recommendation of the Executive Committee,

JOSEPH JEFFERSON, of Buzzard's Bay,

was elected an Honorary Member of the Society, and

Professor BYRON D. HALSTED, of New Brunswick, N. J.,

was elected a Corresponding Member.

Adjourned to Saturday, May 4.

BUSINESS MEETING.

SATURDAY, May 4, 1895.

An adjourned meeting of the Society was holden at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair.

The following named persons, having been recommended by the Executive Committee as members of the Society, were on ballot duly elected:

DUDLEY L. PICKMAN, of Boston,
GEORGE H. LYMAN, of Wareham,
GEORGE P. GARDNER, of Boston.

The Secretary read a letter from Mrs. Mary H. Thomas, acknowledging the receipt of the memorial of her husband, John J. Thomas, adopted by the Society at its last meeting, and expressing the grateful appreciation of it by the family.

Also a letter from Professor Byron D. Halsted, acknowledging the receipt of his Diploma as a Corresponding Member of the Society, and thanking the Society therefor.

Also a letter from William J. Stewart, President of the Gardeners' and Florists' Club of Boston, inviting the members of this Society to attend a meeting of the club on the evening of Tuesday, the 7th instant, when Mr. Henry O'Meara would read a paper on "The Poetry of Flowers."

Adjourned to Saturday, June 1.

BUSINESS MEETING.

SATURDAY, June 1, 1895.

An adjourned meeting of the Society was holden at eleven o'clock, Vice President CHARLES H. B. BRECK in the chair.

The Librarian laid before the Society a copy of "L'Horticulture dans les Cinq Parties du Monde," a gift to the Library from the author, Charles Baltet, Président de la Société Horticole, Vigneronne, et Forestière de l'Aube, Troyes, France, and moved that the thanks of the Society be presented to M. Baltet for the gift of this most important work, which motion was unanimously carried.

The meeting was then dissolved.

BUSINESS MEETING.

SATURDAY, July 6, 1895.

A duly notified stated meeting of the Society was holden at eleven o'clock, Vice President C. H. B. BRECK in the chair.

On motion of Ex-President William C. Strong, it was voted to take up the consideration of the amendments to the Constitution and By-Laws, which received a majority vote at the Stated Meeting on the 6th of April and were laid over for consideration at this meeting, and they were finally adopted as reported by the Committee.

Adjourned to Saturday, August 3.

BUSINESS MEETING.

SATURDAY, August 3, 1895.

An adjourned meeting of the Society was holden at eleven o'clock, Vice President C. H. B. BRECK in the chair.

The Chair announced the following named persons as the Committee to nominate candidates for Officers and Standing Committees for the next year, appointed by the President agreeably to the Constitution and By-Laws:

WILLIAM H. SPOONER, *Chairman*,

BENJAMIN M. WATSON, JR., PATRICK NORTON,
SAMUEL HARTWELL, HENRY W. WILSON,
BENJAMIN P. WARE, C. MINOT WELD.

The following named persons, having been recommended by the Executive Committee as members of the Society, were on ballot duly elected:

John T. Brown, of Newburyport,
Charles H. Souther, of Jamaica Plain,
Richard F. Barrett, of Concord.

Adjourned to Saturday, September 7.

BUSINESS MEETING.

Saturday, September 7, 1895.

An adjourned meeting of the Society was holden at eleven o'clock, the President, Nathaniel T. Kidder in the chair.

William H. Spooner, Chairman of the Committee to nominate candidates for Officers and Standing Committees for the year 1896, presented a printed list. This report was accepted and it was voted that the Committee be continued and requested to nominate candidates in place of any who might decline before the election.

Mr. Spooner announced the decease of Benjamin P. Cheney, and moved the appointment of a Committee to prepare an expression of the Society's regard for him. The motion was carried, and the Chair appointed as that Committee, Benjamin G. Smith, Benjamin C. Clark, and Walter Hunnewell.

The meeting was then dissolved.

BUSINESS MEETING.

Saturday, October 5, 1895.

A Stated Meeting of the Massachusetts Horticultural Society, being the annual meeting for the choice of Officers and Standing Committees was holden at eleven o'clock, the President, Nathaniel T. Kidder, in the chair.

The Secretary stated that the meeting had been duly notified to the members of the Society, agreeably to the Constitution and By-Laws.

William H. Spooner, Chairman of the Nominating Committee, reported that that Committee had nominated Frederick S. Davis as a member of the Committee on Flowers in place of Walter H. Cowing, who was unable to serve.

Agreeably to the Constitution and By-Laws the Chair appointed Samuel Hartwell, James Wheeler, and A. Chandler Manning, a Committee to receive, assort, and count the votes given, and report the number.

On motion of Mr. Spooner it was voted that the polls remain open for two hours. The polls were opened at twelve minutes past eleven o'clock.

Benjamin G. Smith, Chairman of the Committee appointed at the last meeting to prepare a memorial of Benjamin P. Cheney, reported the following:

Benjamin Pierce Cheney was one of New England's noblest sons, and was an honored and respected member and benefactor of the Massachusetts Horticultural Society. He was born in New Hampshire; the personal friend and admirer of Daniel Webster, he presented to the State of New Hampshire the finest bronze statue of the departed statesman ever executed. He was one of three gentlemen, members of the Massachusetts Horticultural Society, who presented the three beautiful statues of Flora, Pomona, and Ceres which adorn this building. He was a member of the Finance Committee from 1867 to 1880 inclusive. He was one of the most successful business men of our time. His generosity without ostentation through his long and successful business life, his fidelity, his urbanity, and the uniform consistency of character for which he was distinguished, have secured for him a high place in the estimation of his fellow citizens. He was upright in business and attached to him his numerous employees, many of whom remained with him during his long business life. No better evidence of his honorable course can be given. We who knew him thoroughly can testify to his princely gifts unknown to the public; he never sought but avoided notoriety in dispensing his benefactions; thousands of dollars at a time were given by him for worthy objects unknown to the world. He

was the architect of his own fortune; self-reliant he depended upon his own judgment in making his investments. With all his activity he found time to cultivate his intellectual endowments, with which he was unusually gifted.

His view of life and duty was broad; his tastes and conversation refined. His was a well-balanced and symmetrical nature. His conversational powers were of the highest order. It was a pleasure to listen to him, and those who had the pleasure of his acquaintance and friendship can never forget him.

Resolved, That in the death of Mr. Cheney not only this Society but the whole community suffer a severe and irreparable loss.

Resolved, That these sentiments of respect and affection, with the earnest expression of sincere condolence be communicated to the bereaved family of the deceased.

BENJAMIN G. SMITH,
BENJAMIN C. CLARK, } *Committee.*
WALTER HUNNEWELL,

The memorial was unanimously adopted.

The President, as Chairman of the Executive Committee, reported a recommendation that the Society make an additional appropriation of $200 for the Flower Committee the present year. The report was accepted and the appropriation was voted.

The following named persons, having been recommended by the Executive Committee as members of the Society, were upon ballot duly elected:

WILLIAM S. KEMP, of Brookline,
JOHN CROWLEY, of Dedham,
AMORY A. LAWRENCE, of Boston,
AMOS A. Lawrence, of Boston,
ORLENDO W. DIMICK, of Watertown,
MRS. I. TISDALE TALBOT, of Boston.

CHARLES BALTET, Président de la Société Horticole, Vigneronne, et Forestière de l'Aube, Troyes, France, was upon recommendation of the Executive Committee elected a Corresponding Member of this Society.

The polls were closed at twelve minutes past one o'clock, and the Committee to receive, assort, and count the votes, and report the number given, reported the whole number to be one hundred and one, and that the persons named on the ticket reported by the Nominating Committee had a plurality of votes and were elected.

The report of the Committee was accepted, and the above mentioned persons were, agreeably to the Constitution and By-Laws, declared by the President to have a plurality of votes and to be elected Officers and Standing Committees of the Society for the year 1896.

Adjourned to Saturday, November 2.

BUSINESS MEETING.

SATURDAY November 2, 1895.

The last meeting of the Society adjourned to today, and the members present were called to order by the President, but no quorum was present, and the meeting

Adjourned to Saturday, December 7.

BUSINESS MEETING.

SATURDAY, December 7, 1895.

An adjourned meeting of the Society was holden at eleven o'clock, the President, NATHANIEL T. KIDDER, in the chair.

The President, as Chairman of the Executive Committee, reported a recommendation from that Committee that the Society make the following appropriations for Prizes and Gratuities for the year 1896, viz.:

For Plants, ...	$2,000
" Flowers, ...	2,600
" Fruits, ...	1,800
" Vegetables, ...	1,150
" Gardens, ...	500
Total,	$8,050

The report was accepted, and, agreeably to the Constitution and By-Laws, was laid over for final action at the Stated Meeting of the Society on the first Saturday in January, 1896.

The President further reported from the Executive Committee a recommendation that the Society appropriate $300 for the Committee on Lectures and Publication, this sum to include the income of the John Lewis Russell Fund. This report was accepted and laid over until the first Saturday in January.

John G. Barker, Chairman of the Committee on Gardens, made a partial report, being the awards of Prizes and Gratuities made by that Committee, and asked for further time to prepare the remainder of the report. The report, so far as made, was accepted and further time was granted.

E. W. Wood, Chairman of the Committee on Fruits, read the Annual Report of that Committee, and also his report as Delegate to the State Board of Agriculture.

Joseph H. Woodford, Chairman of the Committee of Arrangements, read the Annual Report of that Committee.

Arthur H. Fewkes, Chairman of the Committee on Flowers, read the Annual Report of that Committee.

Azell C. Bowditch, Chairman of the Committee on Plants, read the Annual Report of that Committee.

These five reports were severally accepted and referred to the Committee on Publication.

The following named persons, having been recommended by the Executive Committee for membership in the Society, were on ballot duly elected:

Robert D. Ireland, of Winthrop,
George M. Anderson, of Milton,
Charles W. Hallstram, of Boston,
Edward Hatch, of Boston,
H. Fisher Eldredge, of Boston,
Hon. Edward P. Shaw, of Newburyport,
James E. Rothwell, of Brookline,
Alexander Montgomery, of Natick,
Joseph W. Howard, of Somerville,
Mrs. Elizabeth S. Cheney, of Wellesley,
George A. Gardner, of Boston,
Micajah Pratt Clough, of Lynn.

The Secretary laid before the Society a letter from Mrs. Elizabeth S. Cheney to Benjamin G. Smith, Chairman of the Committee to prepare a memorial of the late Benjamin P. Cheney, acknowledging the receipt of the memorial and returning heartfelt thanks therefor, from herself and family.

Also a letter from Charles Baltet, of Troyes, France, acknowledging the receipt of the notice of his election as a Corresponding Member of the Society, expressing his pleasure at this action of the Society, and offering to the Library any of his works that are not already in it.

Adjourned to Saturday, December 21.

BUSINESS MEETING.

SATURDAY, December 21, 1895.

The last meeting of the Society adjourned to today, and the members present were called to order by the President, but no quorum was present and the

Meeting was dissolved.

REPORT

OF THE

COMMITTEE ON PLANTS,

FOR THE YEAR 1895.

By AZELL C. BOWDITCH, Chairman.

Another year has passed over our heads, but we can hardly congratulate ourselves upon any very marked improvement in our exhibitions, with the exception of Orchids and Chrysanthemums, both of which were very fine and showed much improvement over former years. The absence of some of our larger growers of greenhouse plants was quite marked, and that very interesting class of trees, the Conifers, which are not only ornamental but instructive, was sadly missed the past season. But every Saturday, from early in the year to its close, has brought enough to please the eye and foster the ever-growing interest of both the amateurs and the public. The love of plants is ever on the increase and it will be the aim of your Committee, in the future as in the past, to encourage it by awarding the most liberal prizes offered by the Society, in as judicious and impartial a manner as possible.

The first exhibit for prize was on February 12, for Chinese Primroses, for which there were two competitors, John L. Gardner and Mrs. Benjamin P. Cheney.

Nathaniel T. Kidder showed a fine plant of *Acacia heterophylla*.

January 26, from the Botanic Garden of Harvard University came a fine plant of *Angrœcum sesquipedale*, with seven spikes, having sixteen blooms.

February 21. The Society offered $100 in prizes for Palms and other Decorative Plants at the meeting of the American Carnation Society, which was competed for by Nathaniel T. Kidder and John L. Gardner. John M. Anderson also made a very fine display of Cyclamens. George M. Nicholson showed some fine Cinerarias grown in six-inch pots.

March 11. William H. Spooner showed the Crimson Rambler Rose. Too much cannot be said of this introduction, as it fills a place long vacant in the gardens. The Bussey Institution exhibited some fine Anemones, and James Comley a plant of *Rhododendron Livingstonii.*

SPRING EXHIBITION.

March 26, 27, 28, and 29.

The display of Orchids, Azaleas, Cyclamens, Tulips, Hyacinths, and Narcissuses, with other Spring Flowering Bulbs, was remarkably fine. Dr. C. G. Weld and James Comley made fine displays of Indian Azaleas.

Mrs. Frederick L. Ames made a magnificent display of Orchids, among which were *Cattleya Trianæ*, *C. Mossiæ*, and *C. Mendelli*, *Odontoglossum grande*, *O. aspersum*, *O. cordatum*, *Cypripedium Measuresianum*, *C. vexillarium*, and many others, in all about fifty plants.

The Bussey Institution made a nice showing of India Azaleas. Edward Butler and Dr. C. G. Weld exhibited some fine plants. Mr. Butler also had three fine Orchids.

The Cyclamens were the finest ever exhibited; the plants from Mrs. Benjamin P. Cheney were two feet in diameter and covered with hundreds of blooms; other exhibitors were George M. Anderson, Dr. C. G. Weld and Nathaniel T. Kidder.

Cinerarias were exhibited by George M. Anderson, John L. Gardner, Mrs. Benjamin P. Cheney, and James Carthley.

The *Ouvirandra fenestralis* or Madagascar Lace Plant was exhibited by Elisha S. Converse; this most beautiful and curious aquatic plant attracted much attention.

The rest of the exhibition was made up of some very fine displays of Tulips, Hyacinths, Narcissuses, Lilies of the Valley, Freesias, Tritonias, etc., the whole forming one of the finest displays of Spring Flowering Plants and Bulbs ever held in the hall.

MAY EXHIBITION.

May 4.

In the class of Pelargoniums Nathaniel T. Kidder had no competitor.

In the Calceolarias there was quite a rivalry, the first prize going to Dr. C. G. Weld for six nicely grown plants, remarkable for the brilliant green and closeness of their foliage. Dr. Weld also exhibited fifteen plants of Streptocarpus.

Nathaniel T. Kidder showed *Cymbidium Lowianum.*

May 24, Walter H. Cowing exhibited a new seedling Canna; it was of a bright clear yellow with lips spotted with carmine, for which he was awarded a First Class Certificate of Merit.

June 6, Mrs. Frederick L. Ames and John L. Gardner made fine displays of Orchids.

The exhibit of Cattleyas from John L. Gardner, was particularly good; indeed your Committee thought it the best ever made in the hall.

ROSE AND STRAWBERRY EXHIBITION.

June 20 and 21.

There was but one exhibit of Stove and Greenhouse plants, by Dr. C. G. Weld. John L. Gardner sent a fine plant of Rhynchospermum, exhibited as a specimen plant. James Comley showed a large plant of Rhododendron. Dr. C. G. Weld and Elisha S. Converse exhibited some good plants of Tuberous Begonias.

July 20, Oakes Ames, exhibited *Cypripedium bellatulum* and *C. Chamberlainianum.*

July 27, Mrs. Frederick L. Ames exhibited *Cypripedium Annie Measures*, a cross between *C. Dayanum* and *C. bellatulum*, for which she was awarded a First Class Certificate of Merit.

E. V. R. Thayer exhibited six plants of *Saintpaulia Ionantha*, which belongs to the Gesneria family. Seed sown in February flowers in July, and it may become a very desirable house plant. Awarded a First Class Certificate of Merit.

August 1, William Wallace Lunt sent *Cattleya Rex.* This is one of the most beautiful and highly colored of the Cattleyas. Awarded a First Class Certificate of Merit.

August 10, The Botanic Garden of Harvard University exhibited a plant of *Agave Kerchovei*, with flower stem nineteen feet high — quite a curiosity. Nicholson's "Dictionary of Gardening," says that the flower is unknown. Awarded a gratuity.

ANNUAL EXHIBITION OF PLANTS AND FLOWERS.

September 4 and 5.

There was no exhibit of Hardy Coniferous Trees. Your Committee have thought it advisable to increase the prizes as they were too small to induce growers to handle them. It is hoped the coming season, with the larger prizes, to have a creditable show. This exhibition was again notable for the absence of Greenhouse plants, such as Palms, Aralias, Cycads, Ferns, etc., in groups. For the six plants and single specimens there were the usual competitors.

Mrs. Frederick L. Ames exhibited a beautiful plant of *Sophro-Lœlia Veitchii*, for which a Silver Medal was awarded; also a plant of *Cypripedium Miss Ames*, a new hybrid, which received a First Class Certificate of Merit.

October 19, Rea Brothers exhibited a plant of *Scabiosa Caucasica* var. *alba*, a new perennial said to be hardy; if it proves so it will be quite an acquisition. It received the award of Honorable Mention.

CHRYSANTHEMUM EXHIBITION.

November 5, 6, 7, and 8.

In commenting on this exhibition your Committee would say that while the plants were grand and were the best ever seen in these halls, and perhaps as good as any seen on the other side of the ocean, they must deprecate the use of superfluous stakes and in order to further their disuse your Committee have offered three prizes for plants grown to a single stem, with bushy tops, and without the aid of stakes, hoping by this means to bring into the market a class of plants more suitable for table and window decoration. The varieties in the collection from Nathaniel T.

Kidder (William J. Martin, gardener), which took the first prize for twelve plants of any or all classes, were:

Clinton Chalfant,	Joseph H. White,
Golden Hair,	Louis Boehmer,
H. L. Sunderbruch,	Portia,
Iora,	Superbiflora,
Ivory,	Vernal Fall,
John Shrimpton,	W. H. Lincoln.

Walter Hunnewell (T. D. Hatfield, gardener), exhibited a group of twelve plants that were a great credit to him. The Committee were put to their best endeavors to award this prize, the competition was so close.

Mr. Hunnewell's Collection comprised

Clinton Chalfant,	Mirabeau,
Columbine,	Octavia,
George W. Childs,	Portia,
Joseph H. White,	Primula,
Louis Boehmer,	Theo,
Louis Menand,	W. H. Lincoln.

Mr. Kidder had for his Specimen Japanese a most beautiful plant of the pink Iora, which for good points probably never had its equal in this country. It was fully six feet high and as many in diameter.

The names of other exhibitors may be found in the award of prizes in the different classes.

The Society's appropriation was . .		$2,100 00
Prizes awarded	$1,643 00	
Gratuities awarded	371 00	
Two silver medals awarded . . .	10 00	
	$2,024 00	
Balance unexpended,	76 00	
		2,100 00

A. C. Bowditch,
James Comley,
James Wheeler,
William Robinson,
David Allan,
} *Committee.*

PRIZES AND GRATUITIES AWARDED FOR PLANTS.

1895.

January 12.

Chinese Primroses.— Six plants in six-inch pots, John L. Gardner	$5 00
Second, Mrs. Benjamin P. Cheney	4 00
Third, John L. Gardner	3 00
Lachenalias.— Three six-inch pots, the second prize to John L. Gardner	3 00
Gratuities:—	
Nathaniel T. Kidder, *Acacia heterophylla*	3 00
Margaret L. Waite, *Ornithogalum rigidulum*	1 00

MEETING OF THE AMERICAN CARNATION SOCIETY.

February 21 and 22.

Palms and Other Decorative Plants.— Best display, Nathaniel T. Kidder	50 00
Second, John L. Gardner	30 00
Gratuities:—	
George M. Anderson, Display of Cyclamens	15 00
Nathaniel T. Kidder, " " "	5 00
George M. Nicholson, " " Cinerarias	6 00

March 11.

Gratuities:—	
Bussey Institution, Display of Anemones	3 00
James Comley, *Rhododendron Livingstonii*	3 00

SPRING EXHIBITION.

March 26, 27, 28, and 29.

Theodore Lyman Fund.

Indian Azaleas.— Six distinct named varieties, in pots, Dr. C. G. Weld	30 00
Second, James Comley	20 00
Orchids.— Display, with Foliage Plants, arranged for effect in a space eight feet by five feet, Mrs. Frederick L. Ames	30 00
Second, John L. Gardner	25 00

Society's Prizes.

INDIAN AZALEAS.—Four distinct named varieties, in not exceeding ten-inch pots, Bussey Institution	12 00
Second, Bussey Institution	10 00
Two distinct named varieties, Mrs. Henry F. Durant	6 00
Second, Dr. C. G. Weld	4 00
Specimen plant, named, Mrs. Henry F. Durant	8 00
Second, Bussey Institution	6 00
Single plant of any named variety, in not exceeding an eight-inch pot, Elisha S. Converse	5 00
Second, Dr. C. G. Weld	4 00
ORCHIDS.—Three plants in bloom, Mrs. Henry F. Durant	10 00
Single plant in bloom, Mrs. Henry F. Durant	5 00
Second, Nathaniel T. Kidder	4 00
Third, John L. Gardner	3 00
STOVE OR GREENHOUSE PLANTS.—Specimen in bloom, other than Azalea or Orchid, named, John L. Gardner	8 00
Second, Dr. C. G. Weld	6 00
HARD-WOODED GREENHOUSE PLANTS.—Four, in bloom, Dr. C. G. Weld	8 00
Second, Dr. C. G. Weld	6 00
HARDY FLOWERING DECIDUOUS SHRUBS, OTHER THAN AZALEAS, FORCED.—Four, of four distinct species, named, Bussey Institution	8 00
Second, Bussey Institution	6 00
HARDY AZALEAS.—Six plants, Bussey Institution	10 00
Second, Bussey Institution	8 00
HARDY FLOWERING EVERGREEN SHRUBS, FORCED.—Four, of four distinct species, Bussey Institution	8 00
CYCLAMENS.—Ten plants in bloom, Mrs. Benjamin P. Cheney	15 00
Second, George M. Anderson	12 00
Third, Mrs. Benjamin P. Cheney	10 00
Fourth, Dr. C. G. Weld	8 00
Ten plants in bloom, in not over seven-inch pots, Dr. C. G. Weld	8 00
Second, Mrs. Benjamin P. Cheney	6 00
Third, George M. Anderson	4 00
Single plant in bloom, Nathaniel T. Kidder	5 00
Second, Mrs. Benjamin P. Cheney	4 00
Third, Mrs. Benjamin P. Cheney	3 00
HARDY PRIMROSES.—Ten plants of distinct varieties, in bloom, John L. Gardner	5 00
POLYANTHUSES.—Ten plants, Fancy and Gold Laced, Bussey Institution	5 00
AURICULAS.—Six, in pots, Dr. C. G. Weld	3 00
Second, Dr. C. G. Weld	2 00

CINERARIAS.— Six varieties in bloom, George M. Anderson	8 00
Second, John L. Gardner	6 00
Third, Mrs. Benjamin P. Cheney	5 00
Three varieties in bloom, James Carthley	5 00
Second, George M. Anderson	4 00
Single plant in bloom, James Carthley	3 00
Second, John L. Gardner	2 00
OUVIRANDRA FENESTRALIS.— Elisha S. Converse	12 00

Spring Flowering Bulbs.

HYACINTHS.— Twelve distinct named varieties, in pots, one in each pot, in bloom, Dr. C. G. Weld	10 00
Second, Bussey Institution	8 00
Six distinct named varieties, in pots, one in each pot, in bloom, Dr. C. G. Weld	6 00
Second, Elisha S. Converse	5 00
Third, Bussey Institution	4 00
Three distinct named varieties, in pots, one in each pot, in bloom, Dr. C. G. Weld	4 00
Second, Elisha S. Converse	3 00
Third, Bussey Institution	2 00
Single named bulb, in pot, in bloom, Elisha S. Converse	2 00
Second, Dr. C. G. Weld	1 00
Three pans, not to exceed twelve inches, ten bulbs of one variety in each pan, Bussey Institution	10 00
Second, Dr. C. G. Weld	8 00
Third, Dr. C. G. Weld	6 00
Two pans, not to exceed twelve inches, with ten bulbs of one variety in each pan, Dr. C. G. Weld	8 00
Second, Bussey Institution	6 00
Third, Bussey Institution	5 00
Single pan, not to exceed twelve inches, with ten bulbs of one variety, Dr. C. G. Weld	5 00
Second, Elisha S. Converse	4 00
Third, Bussey Institution	3 00
TULIPS.— Six eight-inch pans, nine bulbs of one variety in each, in bloom, Dr. C. G. Weld	5 00
Second, William S. Ewell & Son	4 00
Third, Bussey Institution	3 00
Three eight-inch pans, nine bulbs of one variety in each, in bloom, Elisha S. Converse	4 00
Second, William S. Ewell & Son	3 00
Third, Bussey Institution	2 00
Three ten-inch pans, twelve bulbs of one variety in each pan, Dr. C. G. Weld	6 00
Second, Bussey Institution	5 00
Third, William S. Ewell & Son	4 00
Fourth, Bussey Institution	3 00

POLYANTHUS NARCISSUS.—Four seven-inch pots, three bulbs in each, distinct varieties, in bloom, Dr. C. G. Weld	6 00
Second, Dr. C. G. Weld	4 00
Third, Bussey Institution	3 00
JONQUILS.—Six six-inch pots, the number of bulbs in each to be at discretion of the grower, in bloom, Bussey Institution	5 00
Second, William S. Ewell & Son	3 00
Third, Dr. C. G. Weld	2 00
LILIUM LONGIFLORUM.—Three pots, not exceeding ten inches, Bussey Institution	8 00
LILIUM HARRISII.—Three pots, not exceeding ten inches, Bussey Institution	8 00
LILY OF THE VALLEY.—Six six-inch pots, in bloom, Bussey Institution	5 00
Second, William S. Ewell & Son	4 00
ANEMONES.—Three pots or pans, Bussey Institution	5 00
Second, Bussey Institution	4 00
FREESIAS.—Six pots or pans, Dr. C. G. Weld	5 00
Second, John L. Gardner	4 00
Third, Bussey Institution	3 00
IXIAS.—Six pots in varieties, Dr. C. G. Weld	4 00
TRITONIA CROCATA.—Six pots, Dr. C. G. Weld	4 00
ROMAN HYACINTHS.—Six eight-inch pans, ten bulbs in each pan, Dr. C. G. Weld	5 00
Second, William S. Ewell & Son	4 00
Third, Bussey Institution	3 00

Prize for Florists Only.

GENERAL DISPLAY OF SPRING BULBS.—All classes, William S. Ewell & Son	12 00

Gratuities:—

James Comley, Display of thirty pots of Roses, etc.	20 00
Botanic Garden of Harvard University, *Phaius grandifolius*	5 00
David Nevins, *Primula obconica*	2 00
David Allan, Display of Orchids	3 00
David Nevins, Roses in pots	2 00
Charles J. Power, Lily of the Valley	5 00
Nathaniel T. Kidder, Display	8 00
Bussey Institution, "	5 00
Dr. C. G. Weld, "	5 00

MARCH 23.

Gratuity:—

Edward Butler, *Dendrobium nobile*	8 00

APRIL 13.

Gratuities:—

John L. Gardner, Display of Orchids	5 00
H. Hollis Hunnewell, Plant of Crimson Rambler Rose	2 00

MAY EXHIBITION

May 4.

Pelargoniums.— Six named Show or Fancy varieties, in not less than eight-inch pots, in bloom, Nathaniel T. Kidder	8 00
Six named Zonale varieties, in pots, in bloom, Nathaniel T. Kidder	6 00
Indian Azaleas.— Six plants in pots, named, C. Minot Weld	15 00
Second, John L. Gardner	12 00
Single specimen, Nathaniel T. Kidder	5 00
Second, John L. Gardner	4 00
Calceolarias.—Six varieties, in pots, Dr. C. G. Weld	8 00
Second, Elisha S. Converse	6 00
Third, John L. Gardner	4 00
Single plant, Dr. C. G. Weld	3 00
Second, Mrs. Benjamin P. Cheney	2 00
Third, Mrs. Benjamin P. Cheney	1 00
Gratuities :—	
Dr. C. G. Weld, *Lomaria gibba* and fifteen plants of Streptocarpus, etc.	8 00
Walter Hunnewell, Plants of *Calceolaria rugosa*, (a shrubby species)	2 00
Nathaniel T. Kidder, *Cymbidium Lowianum*	2 00
John L. Gardner, Collection of Orchids, etc.	15 00

May 18.

Gratuities :—	
John L. Gardner, *Wistaria Sinensis*	4 00
John L. Gardner, Orchids	10 00

May 24.

Gratuities :—	
John L. Gardner, Display of Orchids	8 00

June 6.

Gratuities :—	
John L. Gardner, Display of Cattleyas (forty plants)	25 00
Mrs. Frederick L. Ames, Display of Orchids	20 00

June 15.

Gratuities :—	
James Comley, Display of Cattleyas	2 00

ROSE AND STRAWBERRY SHOW.

June 20 and 21.

Stove and Greenhouse Flowering Plants.—Two distinct named varieties, in bloom, no Orchid admissible, Dr. C. G. Weld	15 00

Specimen Plant in Bloom.— Named, other than Orchid, John L. Gardner, *Rhynchospermum jasminoides*	7 00
Second, James Comley, *Rhododendron Livingstonii*	5 00
Specimen Foliage Plant.— New and rare, other than Orchid, the Second prize to Dr. C. G. Weld	5 00
Hard-wooded Greenhouse Plants.— Three, of three distinct named varieties, in bloom, John L. Gardner	8 00
Second, John L. Gardner	6 00
Orchids.— Six plants, of six named varieties, in bloom, John L. Gardner	25 00
Three plants, of three named varieties, in bloom, the Second prize to John L. Gardner	10 00
Single specimen, named, Dr. C. G. Weld	8 00
Second, John L. Gardner	6 00
Tuberous Begonias.— Six pots, of six varieties, Dr. C. G. Weld	6 00
Second, Elisha S. Converse	4 00
Gratuities :—	
John L. Gardner, Display of Orchids	15 00
David Allan, *Allamanda Williamsonii*	1 00

June 29.

Gratuity :—	
Joseph Tailby, *Brassia verrucosa*	2 00

July 20.

Hydrangeas.— Pair, in tubs or pots, Samuel J. Trepess	8 00
Single plant, in tub or pot, Samuel J. Trepess	5 00
Gloxinias.— Six pots, in bloom, the Second prize to John P. Spaulding	4 00
Gratuities :—	
Oakes Ames, *Cypripedium bellatulum* and *C. Chamberlainianum*	3 00

July 27.

Gratuity :—	
Mrs. D. E. Butterfield, Gloxinia Plant	1 00

August 3.

Gratuity :—	
Oakes Ames, *Ophiopogon spicatus aureo variegatus*	1 00

August 10.

Gratuity :—	
Bussey Institution, Achimenes	1 00

August 24.

Gratuities :—	
Elisha S. Converse, *Gymnogramme Peruviana*	2 00
Botanic Garden of Harvard University, *Agave Kerchovei*	5 00

ANNUAL EXHIBITION OF PLANTS AND FLOWERS.

SEPTEMBER 4 AND 5.

Special Prizes Offered by the Society.

PALMS.— Pair, in pots or tubs not more than twenty-four inches in diameter, Dr. C. G. Weld,	12 00
Second, Nathaniel T. Kidder	8 00
Pair, in pots not more than fourteen inches in diameter, Elisha S. Converse	8 00
Second, Nathaniel T. Kidder	6 00

Regular Prizes.

GREENHOUSE PLANTS.— Six Greenhouse and Stove Plants, of different named varieties, two Crotons admissible, Nathaniel T. Kidder	30 00
Second, John L. Gardner	25 00
Third, Dr. C. G. Weld	20 00
Single plant for table decoration, dressed at the base with living plants only, only one entry admissible, Elisha S. Converse	6 00
Second, John McKenzie	4 00
Third, Moses T. Stevens	3 00
SPECIMEN FLOWERING PLANT.— Single named variety, Nathaniel T. Kidder	8 00
FUCHSIAS.— Six, in not over ten-inch pots, Nathaniel T. Kidder	6 00
ORNAMENTAL LEAVED PLANTS.— Six named varieties, not offered in the collection of greenhouse plants, Crotons and Dracænas not admissible, Dr. C. G. Weld	20 00
Second, James Comley	15 00
Third, Nathaniel T. Kidder	12 00
Single specimen, variegated, named, not offered in any collection, Nathaniel T. Kidder	6 00
Second, Dr. C. G. Weld	5 00
Third, John L. Gardner	4 00
CALADIUMS.— Six named varieties, Dr. C. G. Weld	6 00
Second, Nathaniel T. Kidder	4 00
FERNS.— Six named varieties, no Adiantums admissible, Nathaniel T. Kidder	10 00
Second, Dr. C. G. Weld	8 00
ADIANTUMS.—Five distinct named species, other than Farleyense, Dr. C. G. Weld	8 00
TREE FERN.— Single specimen, named, not less than six feet in height, Elisha S. Converse	10 00
LYCOPODS.— Four named varieties, Nathaniel T. Kidder	5 00
Second, Dr. C. G. Weld	4 00
DRACÆNAS.— Six named varieties, Dr. C. G. Weld	8 00
Second, Nathaniel T. Kidder	6 00

CROTONS.— Six named varieties, in not less than twelve-inch pots.	
Dr. C. G. Weld	6 00
Second, Dr. C. G. Weld	5 00
Third. John L. Gardner	4 00
CYCAD.— Single plant, named, Mrs. Anna D. Wood	10 00
Second. Elisha S. Converse	8 00
ORCHIDS.— Six plants, named varieties, in bloom, John L. Gardner	15 00
TUBEROUS BEGONIAS.— Six pots of six varieties, Dr. C. G. Weld	6 00
Gratuities:—	
J. W. Howard, Seedling Coleus	2 00
Botanic Garden of Harvard University, Collection	30 00
Elisha S. Converse, Collection	10 00
David Allan, Collection	4 00
SEPTEMBER 21.	
Gratuity:—	
Botanic Garden of Harvard University, Twelve plants of *Nerine Sarniensis*	3 00
SEPTEMBER 28.	
Gratuity:—	
Jason S. Bailey, Display of Orchids	3 00
OCTOBER 2.	
Gratuity:—	
Nathaniel T. Kidder, Display of plants	25 00

CHRYSANTHEMUM EXHIBITION.

NOVEMBER 5, 6, 7, AND 8.

CHRYSANTHEMUMS.— Display of twelve named plants any or all classes, distinct varieties, Nathaniel T. Kidder	60 00
Second. Walter Hunnewell	50 00
Fourth, H. Fisher Eldredge	30 00
Twelve plants of twelve different varieties grown to one stem and bloom, in not over six-inch pots, preference being given to plants not more than three feet in height, Dr. C. G. Weld	12 00
Second, James L. Little	10 00
Third, Elisha S. Converse	8 00
Fourth, Jason S. Bailey	6 00
Red, six plants grown as above but all of one color and different varieties, Dr. C. G. Weld	6 00
Second, James L. Little	5 00
Third, Elisha S. Converse	4 00
White, Dr. C. G. Weld	6 00
Second, James L. Little	5 00
Third, Donald McRea	4 00
Pink, James L. Little	6 00
Second, Dr. C. G. Weld	5 00
Third, Elisha S. Converse	4 00

Yellow, Donald McRea	6 00
Second, James L. Little	5 00
Third, Dr. C. G. Weld	4 00
Any other color, Dr. C. G. Weld	6 00
Second, James L. Little	5 00
Group of plants, arranged for effect, limited to one hundred and fifty square feet, preference being given to collections with palms or other foliage added, Mrs. Benjamin P. Cheney	45 00
Second, J. W. Howard	40 00
Third, A. W. Blake	35 00
Fourth, Bussey Institution	30 00
Fifth, H. F. Eldredge	25 00
Six Japanese, distinct named varieties, Mrs. Benjamin P. Cheney	20 00
Second, Mrs. Benjamin P. Cheney	15 00
Third, Nathaniel T. Kidder	10 00
Specimen Japanese, named variety, Nathaniel T. Kidder	6 00
Second, Mrs. Benjamin P. Cheney	5 00
Third, Walter Hunnewell	4 00
Specimen Pompon, named variety, Arthur Hunnewell	4 00
Gratuities:—	
William H. Elliott, Display	25 00
Mrs. Benjamin P. Cheney, Display of *Adiantum Farleyense*	25 00
Dr. C. G. Weld, Ericas	4 00
Jason S. Bailey, Display,	4 00

NOVEMBER 16.

Gratuity:—	
James Comley, Pots Seedling Chrysanthemum Francis B. Hayes	3 00

SOCIETY'S SILVER MEDAL.

January 26. Botanic Garden of Harvard University, *Angræcum sesquipedale.*

Annual Exhibition, September 4 and 5. Mrs. Frederick L. Ames, *Sophro-Lælia Veitchii.*

FIRST CLASS CERTIFICATES OF MERIT.

March 11. William H. Spooner, Crimson Rambler Rose.

May 24. Thomas H. Westwood, New Seedling Canna.

July 27. Mrs. Frederick L. Ames, *Cypripedium Annie Measures*, cross between *Cypripedium bellatulum* and *C. Dayanum.*

July 27. E. V. R. Thayer, *Saintpaulia Ionantha.*

August 1. William W. Lunt, Cattleya Rex.

Annual Exhibition, September 4 and 5. Mrs. Frederick L. Ames, *Cypriped ium Miss Ames.* (New.)

HONORABLE MENTION.

October 19. Rea Brothers, *Scabiosa Caucasica*, variety *alba.* Hardy perennial.

REPORT

OF THE

COMMITTEE ON FLOWERS,

FOR THE YEAR 1895.

By ARTHUR H. FEWKES, Chairman.

The Committee on Flowers have but little to report for the past year that is of exceptional interest, as the displays have differed but little from those of previous years, although as a whole our exhibitions have averaged better than ever before, particularly in the number of exhibits and in the fewer inferior flowers shown.

The exhibitions during the early months of the year, though not numerous, were excellent and helped very much to enliven the hall at our weekly meetings. Francis Brown Hayes was the principal exhibitor.

The displays of Wild Flowers have been as popular as in previous seasons, and have assumed an importance second to that of no other department in their educational value, and, almost unconsciously it seems, the Society has established a School of Botany, which is quite unique in its way. Nowhere else can the student of that science find such an opportunity for the study of our Native Flora. It has gone beyond a simple matter of local interest, for the reputation of these displays has spread far and wide and there are many who visit our weekly shows purposely to study these exhibits.

When we consider the growing importance of this branch, we can but feel the necessity for competent botanists to act as

judges. A florist, a gardener, or a horticulturist is not necessarily a botanist, and it seems an injustice to both the exhibitor and the judges, that the Flower Committee should be compelled to judge these displays.

The Royal Horticultural Society of England has its Botanical Committee and why can not we also have one? They take charge of all displays of purely botanical interest and are a valuable addition to the Standing Committees of the Society. Such a committee might be entirely independent or act as a division of the regular Flower Committee.

The displays of Carnations on February 21 and 22, when the American Carnation Society held their Annual Meeting, should be mentioned, although the exhibition was not one of our own, but belonged to that Society. It was a grand display of this popular flower, making one wish that we might have a repetition of it annually.

On March 16, a First Class Certificate of Merit was awarded to Alexander McKay, gardener to David Nevins, for superior cultivation of Hybrid Roses under glass, he having made exhibits of flowers which we have never seen equalled. On the same date First Class Certificates of Merit were awarded to Sewall Fisher of Framingham, for a beautiful white seedling Carnation, named Crystal, and Fred Dorner of Lafayette, Ind., for his white seedling Carnation, Storm King. These two varieties are very promising and are superior to other white varieties in cultivation.

SPRING EXHIBITION.

March 26, 27, 28, and 29.

At this exhibition the cut flowers were well represented and were a marked improvement over last year. We were pleased to note a revival of interest in forced Hybrid Roses, which were almost entirely absent from our last Spring Show. There was also more interest shown in the Tea Roses, of which there were excellent examples of several varieties. Carnations are always well represented at this show and are destined to be one of the leading features of it if they receive the encouragement due so beautiful a flower.

The display of Violets was quite remarkable, particularly the flowers shown by David Nevins (Alexander McKay gardener), which were the largest we have ever had the pleasure of examining.

The Antirrhinum is making a place for itself as a winter flower and attracted much attention.

James Comley made a very beautiful display with forced flowers of a form of *Clematis montana* which he raised from seed collected in Japan. If this form proves hardy in this latitude it will be a grand addition to our hardy vines.

MAY EXHIBITION.

May 4.

The displays of flowers at this exhibition were not extensive but were mostly good. Tulips were very poorly shown and there was but one exhibitor of Herbaceous Plants. William Nicholson showed remarkably fine Carnation flowers and as he has made numerous displays of equal quality, we awarded him a First Class Certificate of Merit, for superior cultivation of the Carnation.

From the May Show to the Rhododendron Show the exhibitions were of the usual excellence.

On June 1, First Class Certificates of Merit were awarded to James Comley for a Seedling Rhododendron and Thomas C. Thurlow for *Symplocos Japonica*.

RHODODENDRON SHOW.

June 6 and 7.

This, as usual, was one of our most beautiful exhibitions. The displays of Hardy Rhododendrons were particularly interesting, for they were specimens of the varieties which, with proper care, may be planted out with reasonable certainty that they will live from year to year.

Following is a list of varieties which stood the unusually severe winter of 1894–5 on the grounds of Mr. H. H. Hunnewell; also

a list of twelve hardy varieties which survived the winter on the grounds of Francis B. Hayes at Lexington.

List of varieties of Hardy Rhododendrons, which stood the winter of 1894–5, on the grounds of H. H. Hunnewell at Wellesley.

Bluebell,	Lady Rolle,
Charles Thorold,	Mrs. Arthur Hunnewell,
Countess of Normanton,	Mrs. Heywood,
Duchess of Connaught,	Mrs. H. Ingersoll,
Duchess of Sutherland,	Mrs. R. S. Holford,
Edward S. Rand,	Mrs. Shuttleworth,
F. D. Godman,	Michael Waterer,
F. L. Ames,	Minnie,
James Mackintosh,	Neilsoni,
James Nasmyth,	Princess Mary of Cambridge,
J. Marshall Brooks,	Ralph Sanders,
John Waterer,	Silvio,
Kate Waterer,	St. Simon,
Lady Grey Egerton,	The Queen.

List of twelve Hardy Rhododendrons, which stood the winter of 1894–5, on the grounds of Francis B. Hayes at Lexington, viz:

Album elegans,	H. W. Sargent,
Album triumphans,	Lady Armstrong,
Atrorubrum,	Maculatum,
Caractacus,	Oculatum nigrum,
Delicatissimum,	Roseum elegans,
Everestianum,	Roseum grandiflorum.

Herbaceous Pæonies were almost entirely absent, as this exhibition is fully a week too early for them.

Other seasonable flowers were shown in great quantities and of fine quality, conspicuous among them being the Orchids and Javan Rhododendrons from Mrs. Frederick L. Ames, the Herbaceous Plants from J. W. Manning and the Botanic Garden of Harvard University, and the displays of German Irises, Oriental Poppies, and Pelargoniums.

Mrs. Frederick L. Ames was awarded a First Class Certificate of Merit for *Aristolochia Gigas Sturtevantii*, a gigantic representative of the Dutchman's Pipe family.

ROSE SHOW.

June 20 and 21.

With the present year the manner of showing the roses was changed throughout the entire exhibition. The old wooden boxes were discarded and all flowers were shown in vases, to the manifest improvement in the appearance of the hall.

The present season was a very trying one for the rose; the unseasonably warm weather in April and the dry weather in May did them great harm and materially injured the exhibition as a whole. It was claimed by some that the deficiencies in the exhibits were occasioned by the change in the Schedule whereby all duplicates were prohibited in the different classes when competed for by one individual. This may have made some difference in the general display but when it is considered that there was but one less award made the present year to competitors in the various classes than there was last year it seems unjust to attribute all the injury to that cause.

As has been the rule for several years past the best roses came from the South Shore, principally from Hon. Joseph S. Fay of Wood's Holl. J. Eaton, Jr., of New Bedford, also contributed many fine blooms. In the class for the best single bloom of any variety, Hon. J. S. Fay took all the prizes with the following varieties in the order named, viz: Earl of Dufferin, Princess Rodocanachi, and Margaret Dickson. The first prize for a single bloom of any variety introduced since 1892, was awarded to J. Eaton, Jr., for Marchioness of Londonderry and the second to W. W. Astor, of Newport, R. I., for the same variety.

There were many interesting miscellaneous collections, the Herbaceous Plants being most prominent.

Charles J. Dawson brought from the Bussey Institution, fine flowers of the rare *Ostrowskya magnifica*, a very difficult plant to grow.

James Comley was awarded a First Class Certificate of Merit for a seedling *Rhododendron maximum*, with white flowers blotched with yellow.

On several occasions Mr. M. H. Walsh has exhibited his seedling Hybrid Rose, the Michael H. Walsh, and on July 1, 1893, he was awarded a First Class Certificate of Merit for it. The rose appeared to us to have so much promise that we deemed it expedient to see the plants growing and flowering in the open ground, and on invitation of Mr. Walsh we visited the grounds of Hon. Joseph S. Fay, his employer, on July 9, of this year, to make a further examination of the variety. The rose exceeded our most sanguine expectations, and of the great number of older varieties in Mr. Fay's collection, the cream of the European productions, there was not one to surpass this in beauty or vigor. This is the more remarkable when we take into consideration that of the hundreds of varieties of Hybrid Roses there are but two or three of any merit that are of American origin. With this fact in mind it was the unanimous opinion of the Committee that the Society should bestow upon it the highest honor within its power. We therefore awarded Mr. Walsh the Society's Gold Medal.

The exhibition of the week after the regular Rose Show has assumed considerable importance as a rose exhibition, and the roses shown are often superior to many at the regular show. This season June 29 was no exception, and we had fine displays of Hybrid Roses, *Iris Kœmpferi*, English Irises, Delphiniums, *Lilium candidum*, *Campanula Medium*, Herbaceous Plants, Native Plants, and a great variety of other seasonable flowers.

July 13 was Hollyhock day, but this has ceased to be the beautiful exhibition it was a few years ago, owing to the ravages of the hollyhock fungus, which has nearly put a stop to hollyhock growing in this region.

On this date William Robinson was awarded a Silver Medal for a seedling Sobralia named *Amesiæ*, a cross between *xantholeuca* and *Williamsii*. This is a very beautiful orchid and a credit to its originator. Mrs. Frederick L. Ames was awarded a First Class Certificate of Merit for a number of beautiful varieties of Javan Rhododendrons.

July 27 was Sweet Pea day and the displays were numerous and beautiful. Particularly valuable were the named varieties from Frederick A. Blake, A. A. Hixon, and John P. Spaulding.

August 3 was prize day for Hardy Nymphæas. The prizes were competed for by Hon. John Simpkins and Oakes Ames and

won in the order named. The collection of Mr. Simpkins was of extraordinary merit and manifested great skill in cultivation. It included several new varieties, three of which were awarded First Class Certificates of Merit; *N. Laydekeri lilacina*, an improved *Laydekeri rosea; N. Marliacea flammea*, a magnificent cup-shaped flower of about four rows of petals, which are very broad and rounded, deep lilac-carmine in color, with large yellow disk in the centre; and *N. Marliacea Robinsonia*, a very large carmine-rose colored flower with pointed petals. Mr. Simpkins was also awarded the Appleton Silver Medal for the great excellence of his exhibit.

Mrs. Frederick L. Ames was awarded a First Class Certificate of Merit for new Montbretias.

ANNUAL EXHIBITION.

September 4 and 5.

The cut flowers at this show, while making a very important part of the exhibition, were not, as a whole, so numerous as they have sometimes been. Dahlias were shown in great quantities and of fine quality. The Aquatics are always interesting and on this occasion they attracted much attention. The *Victoria regia* was much missed but the displays of Nymphæas and Nelumbiums were quite equal to any previous show of them.

First Class Certificates of Merit were awarded to J. W. Howard for a new Chrysanthemum-flowered Double Sunflower, a most remarkable form of this old plant; and to P. Bisset for a Seedling Nelumbium, deep rosy-carmine in color, grown from seed sent from Corea.

Robert Christie was awarded Honorable Mention for a collection of Seedling Cannas, and Warren W. Rawson & Co. were awarded the Society's Silver Medal for a collection of Dahlias which were well arranged, of the best quality, and exceeded in extent any previous exhibition of this flower known to us.

September 14, Oakes Ames was awarded Honorable Mention for a white Nelumbium, *N. album grandiflorum*.

CHRYSANTHEMUM SHOW.

NOVEMBER 5, 6, 7, AND 8.

Two years ago it seemed as though the height of perfection had been reached in the cultivation of Chrysanthemums, but there has been steady improvement and the show of flowers this year eclipsed all our previous exhibitions, particularly in the size and finish of blooms. The flowers from John Simpkins and Edmund Wood & Co. were marvels in size and symmetry. It would be useless to attempt to select any special varieties from their exhibits for they were all so good.

There were very few classes that were not competed for and very few displays not in competition. As usual the greatest competition was in the classes for twenty-five flowers of twenty-five varieties, there being no less than eight competitors and only three prizes to award.

Special effort was made this year to bring the Anemone-flowered class more into notice and exhibit the strange forms peculiar to this class. The display by Hon. John Simpkins of these flowers was a remarkable one and illustrated their peculiarities in a marked manner.

Seedlings were less numerous than for several years, the most promising being the pink variety shown by E. G. Hill of Richmond, Ind., named Mrs. Perrine; the bronze-yellow variety from H. A. Gane, named West Newton, and the white variety from J. Eaton, Jr., named J. H. Woodford. First Class Certificates of Merit were awarded to T. D. Hatfield for a new seedling named Sundew, and to H. A. Gane for a new seedling Anemone-flowered, named Marcia Jones. Complimentary notice was issued to Mr. H. A. Gane for four new seedling Chrysanthemums.

Nathaniel T. Kidder, having obtained the greatest number of first prizes throughout the season for Herbaceous Plants, became entitled to the Appleton Silver Medal, and J. W. Manning to the Appleton Bronze Medal for the next greatest.

The Committee have awarded during the year one Society's Gold Medal, two Society's Silver Medals, two Appleton Silver Medals, one Appleton Bronze Medal, sixteen Certificates of Merit, two Honorable Mentions and one Complimentary Notice.

The amount appropriated for the year 1895 was .	$2,500 00
Additional appropriation	200 00
	2,700 00
We have awarded in prizes and gratuities, including medals	2,660 00
Leaving an unexpended balance of . . .	$40 00

All of which is respectfully submitted.

For the Committee,

ARTHUR H. FEWKES,

Chairman.

PRIZES AND GRATUITIES AWARDED FOR FLOWERS.

1895.

January 5.

Gratuities: —

Francis Brown Hayes, Display of Flowers	4 00
W. E. Coburn, Chinese Primulas	1 00

January 12.

Gratuities: —

Francis Brown Hayes, Camellias	4 00
David Nevins, Two bunches Marie Louise Violets	2 00
W. N. Craig, Vase of *Freesia refracta alba*	2 00
William Nicholson, Carnations	1 00
W. E. Coburn, Chinese Primulas	1 00
Mrs. E. M. Gill, Display of Flowers	2 00

January 19.

Gratuities: —

Francis Brown Hayes, Cut Flowers	4 00
Mrs. E. M. Gill, " "	1 00

January 26.

Gratuities: —

Francis Brown Hayes, Camellias	3 00
George M. Anderson, Cyclamens	1 00

February 2.

Orchids.— Display of named species and varieties, filling not less than twelve bottles, Mrs. F. L. Ames	15 00
Second, Mrs. F. L. Ames	10 00
Violets.— Best collection of varieties, fifty blooms of each in a bunch, W. N. Craig	4 00
Second, Nathaniel T. Kidder	3 00
Third, Harry S. Rand	2 00
Carnations.— Display of cut blooms, with foliage, not less than six varieties, in vases, William Nicholson	5 00
Second, W. N. Craig	4 00
Camellias.— Display of named varieties, cut flowers, with foliage, not less than twelve blooms, of not less than six varieties, Francis Brown Hayes	4 00
Second, John L. Gardner	3 00

Gratuities: —

Francis Brown Hayes, Camellias	3 00
Bussey Institution, Forced Crab Apple blossoms	3 00

Norris F. Comley, Forced Lilacs	1 00
David Nevins, Three vases of Violets	2 00
C. E. Weld, Violets	1 00
W. N. Craig, Vase of *Eucharis Amazonica*	2 00
W. E. Coburn, Chinese Primulas	1 00
C. E. Richardson, Acacia and Azaleas	1 00
Mrs. E. M. Gill, Display of Flowers	3 00
Mrs. A. D. Wood, Cut Flowers	2 00
Mrs. P. D. Richards, Wild Flowers	1 00

FEBRUARY 9.

Gratuities : —

Bussey Institution, Display of Forced Shrubs and Flowers	3 00
Mrs. E. M. Gill, Cut Flowers	1 00

FEBRUARY 16.

Gratuities : —

Bussey Institution, Cherokee Roses	1 00
Mrs. E. M. Gill, Cut Flowers	1 00

FEBRUARY 22.

Gratuities : —

Mrs. A. D. Wood, *Antirrhinum majus*	3 00
Dailledouze Brothers, Flatbush, N. Y., Mignonette	2 00
William W. Edgar, Mignonette	2 00

MARCH 9.

Gratuities : —

David Nevins, Five vases of Hybrid Roses	5 00
James Comley, Camellias, Roses, etc.	4 00
Bussey Institution, Lilies and Rhododendrons	1 00
Harry S. Rand, Six vases of Violets	1 00
Mrs. E. M. Gill, Cut Flowers	1 00

MARCH 16.

Gratuities : —

James Comley, Cut Flowers	4 00
Mrs. A. D. Wood, " "	3 00

SPRING EXHIBITION.

MARCH 26, 27, 28, AND 29.

HYBRID PERPETUAL ROSES.— Twelve cut blooms of not less than six distinct named varieties, David Nevins	8 00
Second, James Comley	6 00
Six cut blooms, distinct named varieties, James Comley	6 00
Twelve cut blooms of Ulrich Brunner, David Nevins	10 00

TENDER ROSES IN VASES.—Twelve blooms of American Beauty, Hon. John P. Spaulding	8 00
Twelve blooms of Catherine Mermet, Thomas H. Meade	8 00
Second, William H. Elliott	6 00
Third, Charles V. Whitten	4 00
Twelve blooms of Meteor, Charles V. Whitten	8 00
Twelve blooms of Papa Gontier, William H. Elliott	8 00
Second, William H. Elliott	6 00
Twelve blooms of The Bride, William H. Elliott	8 00
Second, Charles V. Whitten	6 00
Third, Hon. John P. Spaulding	4 00
Best Tender Rose introduced since 1892, F. R. Pierson, Tarrytown, N. Y., for Bridesmaid	4 00
Second, Hon. John P. Spaulding, for Bridesmaid	3 00
PANSIES.—Forty-eight cut blooms, not less than twenty-four varieties, Hon. Joseph S. Fay	4 00
Second, Hon. Joseph S. Fay	3 00
Third, Hon. Joseph S. Fay	2 00
VIOLETS.—Best bunch of fifty blooms of Czar, Harry S. Rand	2 00
Second, Nathaniel T. Kidder	1 00
Best bunch of fifty blooms of Lady Hume Campbell, Harry S. Rand	2 00
Best bunch of fifty blooms of Marie Louise, David Nevins	2 00
Second, Nathaniel T. Kidder	1 00
Best bunch of fifty blooms of any other variety, Nathaniel T. Kidder, for Swanley White	2 00
Second, Nathaniel T. Kidder, for Neapolitan	1 00
CARNATIONS.—Display of cut blooms, with foliage, not less than six varieties, in vases, William Nicholson	5 00
Second, F. A. Blake	4 00
Twelve blooms of any named Crimson variety, William Nicholson, for Ferdinand Mangold	3 00
Second, Arthur H. Fewkes, for Anna Webb	2 00
Twelve blooms of any named Dark Pink variety, William Nicholson, for Nicholson	3 00
Second, F. A. Blake, for William Scott	2 00
Twelve blooms of any named Light Pink variety, Joseph H. White, for Daybreak	3 00
Second, William Nicholson, for Daybreak	2 00
Twelve blooms of any named Scarlet variety, William Nicholson, for Hector	3 00
Second, L. H. Foster, for The Stuart	2 00
Twelve blooms of any named White variety, David Nevins, for Mrs. Fisher	3 00
Second, F. A. Blake, for Lizzie McGowan	2 00
CAMELLIAS.—Display of named varieties, cut flowers with foliage, not less than twelve blooms, of not less than six varieties, John L. Gardner	4 00

Second, James Comley	3 00
Six cut blooms, of not less than four named varieties, with foliage, Joseph H. White	3 00
Centre Piece.— The last day of the Exhibition, Mrs. E. M. Gill	10 00
Second, Mrs. A. D. Wood	8 00
Bride's Bouquet.— The Second prize to Mrs. E. M. Gill	4 00

Gratuities: —

James Comley, Display of Roses	10 00
David Nevins, Hybrid Perpetual Roses	5 00
F. R. Pierson, Vases of Tea Roses, Meteor and Kaiserin Augusta	2 00
Edward Butler, Thirteen vases of Orchids	3 00
David Allan, Orchids	1 00
C. W. Ward, Collection of Carnations	5 00
Arthur H. Fewkes, Three vases of *Antirrhinum majus*	3 00
William H. Elliott, *Asparagus plumosus nanus*	3 00
James Comley, Wistaria, Rhododendrons, and Clematis	3 00
F. R. Pierson, Tarrytown, N. Y., Display of Cannas	2 00
Harry S. Rand, Eight vases of Violets	2 00
Botanic Garden, Collection of Sarracenias	2 00
Mrs. A. D. Wood, Cut Flowers	4 00
Mrs. E. M. Gill, " " etc.	3 00

April 6.

Gratuity: —

James Comley, Azaleas, Roses, etc.	4 00

April 13.

Gratuity: —

James Comley, Thirty varieties of Roses	2 00

April 20.

Gratuity: —

Mrs. E. M. Gill, Cut Flowers	1 00

April 27.

Gratuities: —

William Nicholson, Carnations	1 00
James Comley, Vase of *Magnolia stellata* and Wistaria	1 00
Mrs. A. D. Wood, Cut Flowers	2 00
Mrs. E. M. Gill, " "	1 00

MAY EXHIBITION.

May 4.

Tulips.— Twenty-four blooms, distinct named varieties, the Second prize to John L. Gardner	4 00

HARDY NARCISSUSES.— Collection of not less than ten named varieties of blooms, in vases, John L. Gardner	6 00
Second, Bussey Institution	5 00
PANSIES.— Forty-eight cut blooms, not less than twenty-four varieties, Hon. Joseph S. Fay	4 00
Second, Hon. Joseph S. Fay	3 00
Third, Hon. Joseph S. Fay	2 00
HERBACEOUS PLANTS.— Thirty bottles, Nathaniel T. Kidder	8 00
NATIVE PLANTS.— Collection not exceeding thirty bottles, Mrs. P. D. Richards	5 00
Second, Miss C. M. Endicott and Miss M. C. Hewett	4 00
Third, Misses Eleanor and Mollie Doran	3 00

Gratuities: —

John L. Gardner, Tulips and Fritillarias	4 00
Dr. C. G. Weld, Display of Narcissuses	4 00
E. S. Converse, Gloxinias	1 00
Hon. Joseph S. Fay, Pansies	3 00
Dr. C. G. Weld, "	1 00
James Comley, Display	5 00
Mrs. E. M. Gill, Cut Flowers	3 00

MAY 11.

Gratuities: —

Hon. Joseph S. Fay, Pansies	4 00
James Comley, Display	4 00
Mrs. E. M. Gill, "	2 00
Mrs. A. D. Wood, "	2 00
Mrs. P. D. Richards, Native Plants	2 00

MAY 18.

Gratuities: —

James Comley, Display	3 00
John L. Gardner, "	2 00
Mrs. A. D. Wood, Cut Flowers	1 00
Mrs. E. M. Gill, " "	1 00
Miss C. M. Endicott and Miss M. C. Hewett, Native Plants	3 00
Mrs. P. D. Richards, Native Plants	3 00
Mrs. Mary E. Loud, " "	2 00

MAY 25.

TREE PÆONIES.— Three double varieties, named, three of each. John L. Gardner	3 00

Gratuities: —

James Comley, Hardy Shrubs and Cut Flowers	5 00
E. Sheppard & Son, Collection of Pelargoniums, Azaleas, etc.	2 00

William Miller and Son, Hardy Pinks	1 00
John L. Gardner, Collection of Cut Flowers	2 00
Mrs. Mary E. Loud, Wild Flowers	3 00
Mrs. P. D. Richards, " "	2 00

JUNE 1.

Gratuities: —

H. H. Hunnewell, Collection of Rhododendrons	5 00
James Comley, Collection of Rhododendrons, Azaleas, Roses and Orchids	7 00
T. C. Thurlow, Collection of Flowering Shrubs	1 00
L. M. Chase, Snowballs, etc.	1 00
Mrs. E. M. Gill, Display	2 00
Mrs. Mary E. Loud, Native Ferns	1 00

RHODODENDRON SHOW.

JUNE 6 AND 7.

H. H. Hunnewell Fund.

RHODODENDRONS.— Twelve distinct varieties, of unquestioned hardiness, named, James Comley, a piece of plate valued at	20 00
Second, John L. Gardner, a piece of plate valued at	15 00
Six distinct varieties, of unquestioned hardiness, named, Samuel J. Trepess	10 00
Second, Mrs. B. P. Cheney	5 00
Six tender varieties, named, James Comley	5 00
Three tender varieties, named, the Second prize to John L. Gardner	3 00
HARDY AZALEAS.— From any or all classes, fifteen varieties, one vase of each, James Comley	8 00
Second, Thomas C. Thurlow	5 00
Twelve varieties, one vase of each, Thomas C. Thurlow	4 00
Cluster of trusses, one variety, Thomas C. Thurlow	2 00

Society's Prizes.

HERBACEOUS PÆONIES.— Twelve named varieties, the Third prize to John L. Gardner	6 00
GERMAN IRISES.— Six distinct varieties, one spike of each, Walter H. Cowing	3 00
Second, George Hollis	2 00
HARDY PYRETHRUMS.— Display, John L. Gardner	3 00
HARDY FLOWERING TREES AND SHRUBS.— Collection of thirty species and varieties, named, cut blooms, the Third prize to Alice Grinnell	5 00
HERBACEOUS PLANTS.— Thirty bottles, J. W. Manning	8 00
BASKET OF FLOWERS.— Mrs. A. D. Wood	5 00
Second, Mrs. E. M. Gill	4 00

NATIVE PLANTS.— Collection not exceeding thirty bottles of named species and varieties, one bottle of each, Mrs. P. D. Richards	5 00
Second, Miss C. M. Endicott and Miss M. C. Hewett	4 00
Third, Misses Eleanor and Mollie Doran	3 00

Gratuities: —

H. H. Hunnewell, Rhododendrons and Azaleas	25 00
James Comley, Display of Rhododendrons and Azaleas	25 00
Mrs. B. P. Cheney, Display of Hardy Rhododendrons	10 00
T. C. Thurlow, Rhododendrons, Azaleas, etc.	6 00
Nathaniel T. Kidder, Rhododendrons	4 00
John L. Gardner, "	3 00
Mrs. F. L. Ames, Orchids and Javanese Rhododendrons	4 00
John L. Gardner, Pæonies	2 00
James Comley, Hardy Flowering Trees and Shrubs, etc.	15 00
Botanic Garden of Harvard University, Display of Herbaceous Plants	10 00
I. E. Coburn, Pelargoniums	3 00
E. S. Converse, Begonias and Gloxinias	2 00
George Hollis, Display of German Irises	2 00
Walter H. Cowing, Oriental Poppies	1 00
" " Aquilegias	1 00
W. N. Craig, Display	3 00
Mrs. E. M. Gill, "	2 00

JUNE 15.

Gratuities: —

Thomas C. Thurlow, Display of Pæonies	8 00
Hon. Joseph S. Fay, " "	6 00
George Hollis, " "	3 00
Hon. Joseph S. Fay, Hybrid Roses	10 00
W. H. Cowing, Spanish Irises	1 00
C. C. Metcalf, Tulip Tree Flowers	1 00
James Comley, Display	4 00
John L. Gardner, "	3 00
Mrs. E. M. Gill, "	2 00
Mrs. A. D. Wood, Cut Flowers	1 00
Miss Alice L. Grinnell, Native Flowers	2 00

ROSE EXHIBITION.

JUNE 20 AND 21.

Special Prize, Theodore Lyman Fund.

HARDY ROSES.— Twenty-four distinct named varieties, three of each variety, Hon. Joseph S. Fay	35 00
Third, Mrs. J. W. Clark	25 00

Special Prizes, offered by the Society.

Six blooms of Alfred Colomb, Hon. Joseph S. Fay	5 00
Six blooms of Baroness Rothschild, Hon. Joseph S. Fay	5 00
Second, James Comley	4 00
Six blooms of John Hopper, Hon. Joseph S. Fay	5 00
Second, James Comley	4 00
Six blooms of Marquise de Castellane, Hon. Joseph S. Fay	5 00
Six blooms of Merveille de Lyon, Dr. C. G. Weld	5 00
Second, Hon. Joseph S. Fay	4 00
Six blooms of Mme. Gabriel Luizet, J. Eaton, Jr.	5 00
Second, Hon. Joseph S. Fay	4 00
Six blooms of Mme. Victor Verdier, Hon. Joseph S. Fay	5 00
Six blooms of Prince Camille de Rohan	5 00
Twelve blooms of any other variety, Hon. Joseph S. Fay for Magna Charta	7 00
Second, Hon. Joseph S. Fay for Gen. Jacqueminot	5 00
Third, Hon. Joseph S. Fay for Ulrich Brunner	4 00
Fourth, Sumner Coolidge for Ulrich Brunner	3 00

Regular Prizes.

Sixteen distinct named varieties, three of each variety, Hon. Joseph S. Fay	20 00
Second, J. Eaton, Jr.	15 00
Twelve distinct named varieties, three of each variety, J. Eaton, Jr.	15 00
Second, Hon. Joseph S. Fay	10 00
Six distinct named varieties, three of each variety, Hon. Joseph S. Fay	10 00
Second, Dr. C. G. Weld	8 00
Third, J. Eaton, Jr.	6 00
Three distinct named varieties, three of each, Hon. Joseph S. Fay	5 00
Second, J. Eaton, Jr.	4 00
Third, Dr. C. G. Weld	3 00
Twenty-four distinct named varieties, one of each, the Second prize to J. Eaton, Jr.	10 00
Eighteen distinct named varieties, one of each, the Second prize to Dr. C. G. Weld	8 00
Twelve distinct named varieties, one of each, the Second prize to Nathaniel T. Kidder	6 00
Best single bloom of any variety, Hon. Joseph S. Fay for Earl of Dufferin	3 00
Second, Hon. Joseph S. Fay, for Princess Rodocanachi	2 00
Third, Hon. Joseph S. Fay, for Margaret Dickson	1 00
Twelve blooms of not less than four varieties, introduced since 1892, Hon. Joseph S. Fay	10 00
Best single bloom of a variety introduced since 1892, J. Eaton, Jr., for Marchioness of Londonderry	5 00

Second, W. W. Astor, Newport, R. I., for Marchioness of Londonderry	4 00
Moss Roses.— Six distinct named varieties, three clusters of each, Hon. Joseph S. Fay	6 00
Second, Dr. C. G. Weld	4 00
Third, John L. Gardner	3 00
Hybrid Tea Roses.— Six named varieties, buds admissible, Hon. Joseph S. Fay	6 00
General Display.— One hundred bottles of Hardy Roses, buds admissible, Hon. Joseph S. Fay	10 00
Second, Mrs. E. M. Gill	9 00
Third, W. W. Astor	8 00
Fourth, James Comley	7 00
Fifth, John L. Gardner	6 00
Basket of Roses.— Arranged for effect, to be shown the second day, the Second prize to James Comley	8 00
Third, Mrs. E. M. Gill	6 00
Foxgloves.— Twelve spikes, Miss M. S. Walker	3 00
Second, John L. Gardner	2 00
Sweet Williams.— Thirty spikes, not less than six distinct varieties, Walter H. Cowing	3 00
Second, W. N. Craig	2 00
Vase of Flowers.— Best arranged, in one of the Society's glass vases, Mrs. A. D. Wood	5 00
Second, Mrs. E. M. Gill	4 00

Gratuities : —

Hon. Joseph S. Fay, Harrison Yellow Roses and Persian Yellow Roses	3 00
Hon. Joseph S. Fay, Display of Roses	30 00
J. Eaton, Jr., Roses	5 00
Mrs. J. W. Clark, Roses	2 00
Patrick Kane, "	2 00
William C. Winter, Hardy Roses	1 00
William H. Spooner, Hybrid Roses	1 00
James Comley, Display of Roses and Flowering Shrubs	10 00
Miss M. S. Walker, Display of Roses, etc.	3 00
George Hollis, Pæonies and Foxgloves	1 00
O B. Hadwen, Pæonies	1 00
Botanic Garden of Harvard University, Herbaceous Plants	10 00
J. W. Manning, Herbaceous Plants	4 00
W. N. Craig, Carnations and Antirrhinums	3 00
Mrs. E. M. Gill, Display of Flowers	3 00
John L. Gardner, Orchids	2 00
Thomas C. Thurlow, Flowering Trees and Shrubs	2 00
Bussey Institution, *Dracunculus vulgaris* and *Ostrowskya magnifica*	1 00
Walter H. Cowing, Spanish Irises	1 00
" " Shirley Poppies	1 00

F. A. Blake, Petunias	1 00
J. W. Howard, Gloxinias	1 00
Miss M. C. Hewett and Miss C. M. Endicott, Wild Flowers	3 00
Mrs. P. D. Richards, Wild Flowers	2 00

JUNE 29.

HARDY ROSES.— Collection, filling fifty vases, one rose in each vase, Hon. Joseph S. Fay	20 00
Second, Hon. Joseph S. Fay	15 00
Third, Mrs. J. W. Clark	10 00
Fourth, James Comley	6 00
IRIS KÆMPFERI.— Fifteen varieties, three of each, in vases, John L. Gardner	6 00
Third, Thomas C. Thurlow	4 00
Six varieties, three of each, in vases, Nathaniel T. Kidder	4 00
ENGLISH IRISES.— Best collection, Walter H. Cowing	3 00
Second, Frederick S. Davis	2 00
DELPHINIUMS.— Collection of twenty spikes, John L. Gardner	5 00
Second, Nathaniel T. Kidder	4 00
Third, Hon. Joseph S. Fay	3 00
LILIUM CANDIDUM.— Twelve spikes, Miss M. S. Walker	4 00
Second, Samuel Hartwell	3 00
Third, Hon. John P. Spaulding	2 00
CAMPANULA MEDIUM.— Collection, not less than twelve bottles, Mrs. E. M. Gill	3 00
Second, Frederick A. Blake	2 00
HERBACEOUS PLANTS.— Forty bottles, J. W. Manning	8 00
Second, Shady Hill Nursery Co.	6 00
BASKET OF FLOWERS.— Mrs. A. D. Wood	5 00
Second, Mrs. E. M. Gill	4 00
Third, James Comley	3 00

Gratuities: —

Hon. Joseph S. Fay, Display of Roses	3 00
James Comley, *Iris Kæmpferi* and Roses	5 00
John L. Gardner, *Iris Kæmpferi* and Delphiniums	2 00
E. Sheppard & Son, Delphiniums and *Iris Kæmpferi*	2 00
Botanic Garden of Harvard University, Display of Herbaceous Plants	10 00
Walter H. Cowing, Shirley Poppies	3 00
Walter H. Cowing, Sweet Williams	1 00
Thomas C. Thurlow, Trees and Shrubs	1 00
Frederick A. Blake, Display of Flowers	3 00
Mrs. E. M. Gill, Display	2 00
Mrs. P. D. Richards, Wild Flowers	2 00

JULY 6.

VASE OF FLOWERS.—Best arranged, in one of the Society's glass vases, Mrs. E. M. Gill	4 00
Second, Mrs. A. D. Wood	3 00
Third, Miss Hattie B. Winter	2 00
NATIVE PLANTS.—Collection, not exceeding forty bottles, Mrs. P. D. Richards	5 00
Second, Misses Eleanor and Mollie Doran	4 00
Third, Miss Alice L. Grinnell	3 00

Gratuities:—

James Comley, Hybrid Roses	2 00
J. W. Manning, Herbaceous Plants	2 00
James Comley, *Iris Kæmpferi.*	2 00
Sumner Coolidge, Hollyhocks	4 00
James Comley, "	1 00

JULY 13.

HOLLYHOCKS.—Double, twelve blooms, of twelve distinct colors, Hon. Joseph S. Fay	5 00
Second, James Comley	4 00
Third, Hon. John P. Spaulding	3 00
Six blooms, of six distinct colors, Hon. Joseph S. Fay	3 00
Second, James Comley	2 00
Third, E. S. Converse	1 00
Twelve spikes, Hon. John P. Spaulding	5 00
Second, James Comley	4 00
Parlor Bouquet, Mrs. A. D. Wood	4 00
Second, Mrs. E. M. Gill	3 00
Third, Miss Hattie B. Winter	2 00

Gratuities:—

Hon. John P. Spaulding, Hollyhocks	3 00
Sumner Coolidge, "	1 00
Hon. Joseph S. Fay, "	1 00
E. Sheppard & Son, "	1 00
J. W. Manning, Herbaceous Plants	5 00
Mrs. F. L. Ames, Orchids	3 00
W. N. Craig, Carnations and Sweet Peas	3 00
Ettore Tassinari, Zinnias	1 00
James Comley, Display	5 00
Mrs. P. D. Richards, Wild Flowers	2 00
Miss Alice L. Grinnell, " "	2 00

JULY 20.

GLOXINIAS.—Twelve vases, cut blooms, three in each vase, arranged with any foliage, Hon. John P. Spaulding	5 00
Second, Moses S. Stevens	4 00
TUBEROUS BEGONIAS.—Twelve vases, three in each vase, arranged with any foliage, Hon. John P. Spaulding	4 00
HARDY FERNS.—Best Display, Mrs. P. D. Richards	5 00

Gratuities:—

Hon. Joseph S. Fay, Hollyhocks	10 00
Botanic Garden of Harvard University, Tuberous Begonias	2 00
Hon. John P. Spaulding, Gladioli	2 00
" " " Sweet Peas	1 00
E. C. Lewis, Sweet Peas	1 00
James Comley, Display	3 00
Mrs. E. M. Gill, "	1 00
Misses Eleanor and Mollie Doran, Native Flowers	3 00
Alice L. and George H. Grinnell, " "	2 00

JULY 27.

SWEET PEAS.—Display, filling thirty vases, arranged with any foliage, Hon. John P. Spaulding	6 00
Second, Frederick A. Blake	4 00
Third, Adin A. Hixon	3 00
Display of named varieties in vases, six sprays in each vase, Frederick A. Blake	4 00
Second, Adin A. Hixon	3 00
Third, Hon. John P. Spaulding	2 00
HERBACEOUS PLANTS.—Forty bottles, Nathaniel T. Kidder	8 00
BASKET OF FLOWERS.—For table decoration, Mrs. E. M. Gill	5 00
Second, Miss Hattie B. Winter	4 00

Gratuities:—

Hon. Joseph S. Fay, Roses, Sweet Peas, and Phlox	4 00
Botanic Garden of Harvard University, Herbaceous Plants	5 00
Hon. Joseph S. Fay, Hollyhocks	2 00
Mrs. F. L. Ames, Collection of twenty-eight varieties of Cypripediums	3 00
Hon. John P. Spaulding, Collection of Cannas	2 00
Oakes Ames, Display of Flowers	2 00
James Comley, Display	2 00
Mrs. P. D. Richards, Wild Flowers	2 00

AUGUST 3.

HARDY NYMPHÆAS.—Collection, with foliage, John Simpkins	10 00
Second, Oakes Ames	8 00

PERENNIAL PHLOXES.—Ten distinct named varieties, one spike of each, George Hollis	5 00
Second, Thomas C. Thurlow	4 00
Third, James Comley	3 00
VASE OF FLOWERS.—For table decoration, James Comley	5 00
Second, Mrs. E. M. Gill	4 00
Third, Miss Hattie B. Winter	3 00
NATIVE FLOWERS.—Collection, not exceeding forty bottles, Mrs. P. D. Richards	5 00
Second, Oakes Ames	4 00
Third, Misses Eleanor and Mollie Doran	3 00
Gratuities:—	
Botanic Garden of Harvard University, Collection of Phloxes	2 00
Hon. Joseph S. Fay, Hybrid Roses	2 00
Hon. John P. Spaulding, Collection of Gladioli	3 00
Botanic Garden of Harvard University, Display of Annuals	4 00
James Comley, Display of Flowers	2 00

AUGUST 10.

GLADIOLI.—Twenty named varieties, in spikes, J. Warren Clark	6 00
Second, James Comley	5 00
Ten named varieties, in spikes, Walter H. Cowing	3 00
Second, William E. Endicott	2 00
Six named varieties, in spikes, John Parker	2 00
Second, Walter H. Cowing	1 00
Display of named and unnamed varieties, filling one hundred vases, arranged for effect, with any foliage, Hon. John P. Spaulding	8 00
Second, William E. Endicott	6 00
PHLOX DRUMMONDI.—Thirty vases, not less than six varieties, L. W. Goodell	4 00
Second, Dr. C. G. Weld	3 00
Third, Hon. John P. Spaulding	2 00
Gratuities:—	
Dr. C. G. Weld, Gladioli	2 00
William Patterson, "	1 00
Hon. John P. Spaulding, Gloxinias	2 00
Nathaniel T. Kidder, Phlox Drummondi	2 00
Aaron Lummus, Dahlias	3 00
William C. Winter, "	2 00
John Parker, Dahlias, etc.	2 00
Oakes Ames, Tank of Water Lilies	4 00
George Hollis, Phlox and Lilies	4 00
L. W. Goodell, Japan Pinks and Begonias	2 00
James Comley, Display of Cut Flowers	3 00
Mrs. E M. Gill, Cut Flowers	1 00
Mrs. P. D. Richards, Wild Flowers	2 00

AUGUST 24.

ASTERS.— Large Flowered, of all classes, fifty vases, not less than twelve varieties, three flowers in each vase, Joseph H. White	5 00
Second, Hon. Joseph S. Fay	4 00
Third, Mrs. Mary T. Goddard	3 00
Truffaut's Pæony Flowered, thirty blooms, not less than twelve varieties, Hon. Joseph S. Fay	5 00
Second, Nathaniel T. Kidder	4 00
Victoria Flowered, thirty blooms, not less than twelve varieties, Joseph H. White	5 00
Second, E. S. Converse	4 00
Pompon, thirty cut plants, not less than six varieties, the Second prize to Mrs. Mary T. Goddard	3 00
HERBACEOUS PLANTS.— Forty bottles, Nathaniel T. Kidder	8 00

ANNUAL EXHIBITION OF PLANTS AND FLOWERS.

SEPTEMBER 4 AND 5.

Special Prize, Theodore Lyman Fund.

AQUATIC PLANTS.— Display, including not less than twelve flowers of Nymphæas or Nelumbiums, Hon. John Simpkins	30 00
Second, L. W. Goodell	20 00
Third, Oakes Ames	10 00

Regular Prizes.

ASTERS.— Collection of fifty flowers, one flower in each vase, preference being given to the collection containing the greatest number of classes, named, L. W. Goodell	5 00
Second, Sumner Coolidge	4 00
DAHLIAS.— Double, twelve blooms, distinct named varieties, L. W. Snow	6 00
Second, John Parker	5 00
Third, Lothrop Higgins	4 00
Six blooms, distinct named varieties, Lawrence H. Parker	4 00
Second, L. W. Snow	3 00
Third, William C. Winter	2 00
Specimen bloom, Lawrence H. Parker	2 00
Second, L. W. Snow	1 00
Liliputian, display, twenty-five bottles, not less than eight named varieties, William C. Winter	4 00
Second, Aaron Lummus	3 00
Third, William E. Endicott	2 00
Single, display of twenty-five spikes, not less than eight varieties, the Second prize to William C. Winter	3 00

LILIUM LANCIFOLIUM.— Collection of named varieties, Sumner Coolidge	4 00
Second, Thomas C. Thurlow	3 00
TROPÆOLUMS.— Display, filling twenty-five vases, Dr. C. G. Weld	4 00
Second, A. L. Cain	3 00
Third, E. S. Converse	2 00
MARIGOLDS.— Display of French and African, filling twenty-five vases, Bussey Institution	3 00
Second, Oakes Ames	2 00
CANNAS.— Collection of not less than ten named varieties, in spikes, with foliage, R. & J. Farquhar & Co.	10 00
Second, Walter H. Cowing	8 00
TUBEROUS BEGONIAS.— Twenty-five spikes, in vases, three spikes in a vase, with foliage, not less than four varieties, Hon. John P. Spaulding	5 00
Second, Dr. C. G. Weld	4 00
Third, Albert H. Brown	3 00
DOUBLE ZINNIAS.— Twenty-five flowers, not less than six varieties, Dr. C. G. Weld	4 00
Second, L. W. Goodell	3 00
Third, John Jeffries	2 00
SINGLE DIANTHUSES.— Collection of Annual and Biennial varieties, filling fifty bottles, L. W. Goodell	4 00
VASE OF FLOWERS.— For table decoration, James Comley	5 00
Second, Mrs. E. M. Gill	4 00
Third, Miss Hattie B. Winter	3 00
NATIVE PLANTS.— Collection, not exceeding forty bottles, Mrs. P. D. Richards	5 00
Second. Misses Eleanor and Mollie Doran	4 00
Third, Phillips Barry	3 00

Gratuities : —

William C. Winter, Display of Dahlias	4 00
James S. Cowles, Newport, R. I., Display of Canna, Mrs. Fairman Rogers	2 00
L. W. Goodell, Sweet Peas and Begonias	2 00
Thomas C. Thurlow, Perennial Phloxes	1 00
James Comley, Display of Cut Flowers	2 00
Mrs. E. M. Gill, " " "	1 00

SEPTEMBER 14.

HERBACEOUS PLANTS.— Forty bottles, Nathaniel T. Kidder	8 00
Second, J. W. Manning	6 00

Gratuity : —

James Comley, Vase of Flowers	3 00

SEPTEMBER 21.

PERENNIAL ASTERS.— Display of Native or Introduced species and varieties, George Hollis	5 00
Second, Mrs. P D. Richards	4 00

Gratuities :—

R. & J. Farquhar & Co., Display of Cannas, Gladioli, etc.	5 00
R. & J. Farquhar & Co., Display of Annuals	2 00
Misses Eleanor and Mollie Doran, Wild Flowers	2 00

OCTOBER 2.

Gratuities :—

James Comley, *Bougainvillea glabra*	2 00
Walter H. Cowing, Display of Cannas	3 00

CHRYSANTHEMUM SHOW.

NOVEMBER 5, 6, 7, AND 8.

Special Prizes from the Josiah Bradlee Fund.

Twenty-five blooms, of twenty-five distinct varieties, named, Hon. John Simpkins, a piece of plate, or value in money	20 00
Second, Walter Hunnewell	15 00
Third, Mrs. B. P. Cheney	10 00
Six vases of six named varieties, ten blooms each, E. M. Wood & Co.	30 00
Second, C. V. Whitten	25 00

Special Prizes offered by the Society.

Best Seedling, never disseminated, three blooms, Red, J. Brydon, for Mars	5 00
Best Seedling, never disseminated, three blooms, Pink, E. G. Hill, Richmond, Ind., for Mrs. Perrine	5 00
Best Seedling, never disseminated, three blooms, White, J. Eaton, Jr., for J. H. Woodford	5 00
Best Seedling, never disseminated, three blooms, Yellow, Mann Brothers, for Theo	5 00
Best Seedling, never disseminated, three blooms, any other color, Henry A. Gane, for West Newton.	5 00

Regular Prizes.

Twelve cut blooms, Incurved, named, in vases, Joseph H. White	10 00
Twelve cut blooms, Japanese, named, in vases, Nathaniel T. Kidder	10 00
Second, Joseph H. White	6 00
Third, W. K. Wood	4 00

Twelve cut blooms, Japanese Incurved, named, in vases, Hon. John Simpkins	10 00
Second, Joseph H. White	6 00
Third, W. K. Wood	4 00
Twelve cut blooms, Anemone, named, in vases, Hon. John Simpkins	10 00
Second, James L. Little	6 00
Six cut blooms, Incurved, named, in vases, William Slack, Stamford, Conn.	6 00
Second, W. K. Wood	4 00
Third, Joseph H. White	2 00
Six cut blooms, Japanese, named, in vases, Hon. John Simpkins	6 00
Second, William Slack,	4 00
Six cut blooms, Japanese Incurved, named, in vases, E. S. Converse	6 00
Second, Mrs. B. P. Cheney	4 00
Third, James L. Little	2 00
Six cut blooms, Reflexed, named, in vases, John Simpkins	6 00
Second, Joseph H. White	4 00
Third, Mrs. B. P. Cheney	2 00
Six cut blooms, Anemone, named, in vases, J. W. Howard	6 00
Second, Dr. C. G. Weld	4 00
Third, E. S. Converse	2 00
Twelve sprays, Pompons, not less than six named varieties, the Second prize to J. W. Howard	4 00
Third, Bussey Institution	3 00
Twelve best varieties, named, introductions of the current year, Hon. John Simpkins	8 00
Second, T. D. Hatfield	6 00
Third, William Slack	4 00
Vase of blooms, on long stems, arranged in the Society's large china vases, Hon. John Simpkins	18 00
Second, Hon. John Simpkins	16 00
Third, Mrs. B. P. Cheney	14 00
Fourth, Joseph H. White	12 00
Fifth, J. W. Howard	10 00
Best vase of ten blooms, on long stems, Red, named, Edmund Wood & Co., for E. Molyneux	10 00
Second, Jeanne W. Howard, for Jeanne Delaux	8 00
Best vase of ten blooms, on long stems, Pink, named, Edmund Wood & Co., for Viviand Morel.	10 00
Second, Mrs. B. P. Cheney, for Viviand Morel	8 00
Third, Mrs. B. P. Cheney, for Inter-Ocean	6 00
Best vase of ten blooms, on long stems, White, named, Edmund Wood & Co., for Mrs. Jerome Jones	10 00
Second, Mrs. B. P. Cheney, for Mutual Friend	8 00
Best vase of ten blooms, on long stems, Yellow, named, Edmund Wood & Co., for Golden Wedding	10 00

Second, Mrs. B. P. Cheney, for Major Bonnaffon	8 00
Third, Mrs. B. P. Cheney, for H. Sunderbruch	6 00
Best vase of ten blooms, on long stems, any other color, named, Edmund Wood & Co., for Robert McInnes	10 00
Second, W. K. Wood, for Golden Hair	8 00

Gratuities: —

David Nevins, Display of Chrysanthemums	10 00
Arthur Hunnewell, Display of Chrysanthemums	5 00
William Nicholson, " " "	5 00
E. S. Converse, Collection of Chrysanthemums	5 00
James Comley, Display of Chrysanthemums	4 00
Mrs. E. M. Gill, Three vases Chrysanthemums	5 00
Hon. John Simpkins, Vase of Chrysanthemums, Pitcher & Manda	4 00
Hon. John Simpkins, Collection of Anemone Flowered Chrysanthemums	10 00
L. W. Goodell, Anemone Flowered Chrysanthemums	1 00
Mrs. E. M. Gill, Chrysanthemums	2 00
William Nicholson, Carnations	3 00
Peter Fisher, "	3 00
Oakes Ames, Nymphæas	2 00
David Allan, *Dipladenia profusa*	2 00

NOVEMBER 23.

Gratuity: —

James Comley, Display of Chrysanthemums	5 00

DECEMBER 7.

Gratuity: —

James Comley, Display of Chrysanthemums	3 00

DECEMBER 21.

Gratuity: —

James Comley, Collection of Chrysanthemums	3 00

SOCIETY'S GOLD MEDAL.

July 9. Michael H. Walsh, Seedling Hybrid Rose, Michael H. Walsh.

SOCIETY'S SILVER MEDALS.

July 13. William Robinson, Seedling Sobralia, *Sobralia Amesiæ xantholeuca* × *Williamsii*.

Annual Exhibition, September 4 and 5. W. W. Rawson & Co., Collection of Dahlias.

APPLETON SILVER MEDALS.

August 3. Hon. John Simpkins, Collection of Hardy Nymphæas.

September 14. Nathaniel T. Kidder, Herbaceous Plants.

APPLETON BRONZE MEDAL.

September 14. J. W. Manning, Herbaceous Plants.

FIRST CLASS CERTIFICATES OF MERIT.

March 16. Alexander McKay, Superior Cultivation of Hybrid Roses under glass.
" " Sewall Fisher, Seedling Carnation Crystal.
" " Frederick Dorner, Lafayette, Ind., Seedling Carnation Storm King.
May 4. William Nicholson, Superior Cultivation of Carnations.
June 1. James Comley, Seedling Rhododendron.
" " Thomas C. Thurlow, *Symplocos Japonica.*
Rhododendron Show, June 6, 7. Mrs. F. L. Ames, *Aristolochia Gigas Sturtevantii.*
Rose Show, June 20, 21. James Comley, Seedling *Rhododendron maximum.*
July 13. Mrs. F. L. Ames, Javanese Rhododendrons.
August 3. Mrs. F. L. Ames, New Montbretias.
August 3. Hon. John Simpkins, *Nymphæa Laydekeri lilacina.*
" " " " " " *Marliacea flammea.*
" " " " " " " *Robinsoniana.*
Annual Exhibition, September 4, 5. J. W. Howard, New Chrysanthemum-flowered Double Sunflower.
" " " " P. Bisset, Seedling Nelumbium.
Chrysanthemum Show, November 5. T. D. Hatfield, New Seedling Chrysanthemum Sundew.
" " " " Henry A. Gane, New Seedling Anemone-flowered Chrysanthemum Marcia Jones.

HONORABLE MENTIONS.

Annual Exhibition, September 4, 5. Robert Christie, Collection of Seedling Cannas.
September 14. Oakes Ames, *Nelumbium album grandiflorum.*

COMPLIMENTARY NOTICE.

Chrysanthemum Show, November 5. Henry A. Gane, Seedling Chrysanthemums.

REPORT

OF THE

COMMITTEE ON FRUITS,

FOR THE YEAR 1895.

By E. W. WOOD, Chairman.

There was less injury to fruit-bearing trees, canes, and vines during the winter of 1894–5 than the average in past years; the extremes of temperature were less, and the ground was more continuously covered with snow, some of the snow falling in November remaining on the ground until after the middle of March.

Several exceptionally warm days in early spring pushed forward the fruit buds, and being followed later by frosts, strawberries and grapes were severely injured, in many places the earlier varieties proving a total failure. The season was favorable for the growth of fruit; while the rainfall was not up to the average it was so evenly distributed that there was less injury from drought than in many of the other States.

It being the off year for Apples the exhibitions of that fruit, especially the late varieties, have not compared favorably with those of the previous years and where the trees were not properly cared for and sprayed, the fruit was so wormy and knurled as to be of little value. Of Pears there has been an average crop and some fine specimens were shown at the exhibitions. There has been little complaint of the blight among the growers the past

season and the pear continues to be less subject to injury from insect pests than most of our fruits.

The Peach crop, the past season, has been the largest for many years; the fruit buds were not so badly killed during the winter as in previous seasons, and there have been good exhibitions of this fruit. Cherries have been shown in less quantity than usual because of late frosts in some localities and rain at the time of ripening. There have been fair exhibits of Plums and the recent introduction of Japanese varieties has caused an increased interest in the cultivation of this fruit. There are several varieties of good quality that seem well adapted to our soil and climate; they are being tested and we shall ere long be able to speak more definitely of their practical value.

The fungous and insect enemies of fruit, where undisturbed, have done the usual amount of injury, but further experience seems to prove that the damage from these pests may be prevented or very much reduced by careful and systematic spraying. The tent caterpillar has not been as numerous as in recent years but the canker worm in some localities destroyed all prospects of a crop, and the ever present codling moth was as numerous as in any previous year, and as the crop of fruit was small a larger proportion than usual bore evidence of his destructive work.

There have been few new fruits shown the past year requiring special mention. The Alice grape, a white variety, from Ward D. Gunn, of Cliftondale, N. Y., was deemed of so much promise that the Committee awarded a First Class Certificate of Merit to the originator. Liberal prizes have been offered by Ex-President Strong the past two years for varieties of Strawberries not previously exhibited, but the competition has not shown anything having as many points of excellence as varieties already in general cultivation. Of recent introductions, the Mackintosh Apple is promising; it is of good quality, bright red in color, slightly below medium size, and an excellent fruit for the table. At the Annual Exhibition, October 2 and 3, William C. Clapp, of Dorchester, showed the seedling pear Harris, which was then in perfect condition. It was of medium size and excellent quality and seemed to the Committee worthy of cultivation. The Marshall Strawberry easily took the lead as an exhibition berry, and its large size, good quality, and perfect form and color recommend it for the amateur, but the plants having been sold in

limited quantities until the past season it is impossible to speak positively of its merits for field culture until the close of next season.

The Committee have awarded in premiums and gratuities $1,528, leaving an unexpended balance of $272.

E. W. Wood,
O. B. Hadwen,
C. F. Curtis,
Warren Fenno,
J. Willard Hill,
Benjamin G. Smith,
Samuel Hartwell,
} *Committee.*

PRIZES AND GRATUITIES AWARDED FOR FRUITS, 1895.

JANUARY 12.

Gratuities :—

George McWilliam, Foreign Grapes	$3 00
Edwin A. Hall, Collection of Pears	1 00
A. H. Lewis, " " "	1 00

FEBRUARY 2.

Gratuities :—

Henry W. Wilson, Display of Tropical Fruits	5 00
A. H. Lewis, Collection of Pears	1 00
Edwin A. Hall, " " "	1 00
O. B. Hadwen, " " Apples	1 00

SPRING EXHIBITION.

MARCH 26, 27, 28, AND 29.

WINTER APPLES.— Baldwin, George C. Rice	3 00
Second, J. V. Fletcher	2 00
Third, Marshall W. Chadbourne	1 00
Northern Spy, F. J. Boyden	3 00
Second, George C. Rice	2 00
Third, George V. Fletcher	1 00
Roxbury Russet, Benjamin P. Ware	3 00
Second, C. C. Boyden	2 00
Third, Littlefield Farm	1 00
Tompkins King, George C. Rice	3 00
Second, Louis J. Kendall	2 00
Third, Samuel Hartwell	1 00
Any other variety, George C. Rice, Yellow Bellflower	3 00
Second, George C. Rice, Mackintosh	2 00
Third, William Everett, Jacobs Sweet	1 00
WINTER PEARS.— Any variety, Leverett M. Chase, Anjou	3 00
Second, Leverett M. Chase, Vicar	2 00
STRAWBERRIES.— One pint, James Comley	3 00

Gratuities :—

E. M. Wight, Strawberry plants in fruit	1 00
Marshall W. Chadbourne, Maple Syrup	1 00

APRIL 6.

Gratuity:—

James Comley, Strawberries	2 00

MAY 4.

Gratuities:—

Rev. Calvin Terry, Collection of Apples	1 00
Elisha S. Converse, Peaches	1 00

MAY 11.

Gratuity:—

William Brown, Peaches	1 00

MAY 18.

Gratuities:—

Benjamin P. Ware, Collection of Apples	1 00
William Brown, Peaches	1 00

MAY 25.

Gratuity:—

Elisha S. Converse, Nectarines	1 00

JUNE 6.

Gratuities:—

William Doran & Son, Strawberries	2 00
William C. Winter, Peaches	1 00

JULY 14.

Gratuities:—

James Comley, Peaches	2 00
J. W. Howard, Marshall Strawberries	1 00

ROSE AND STRAWBERRY EXHIBITION.

JUNE 20 AND 21.

Special Prizes from the Theodore Lyman Fund.

STRAWBERRIES.—For the best four quarts of any variety, Hon.

Joseph S. Fay, for Marshall, the Lyman Plate, value	20 00
Second, Sumner Coolidge, " " " " " "	16 00
Third, J. W. Howard, " " " " " "	12 00
Fourth, Warren Heustis & Son, " " " " "	10 00
Fifth, Marshall F. Ewell, " " " " "	8 00

Special Prizes Offered by the Society.

For the best two quarts of any variety, to be judged by points,

Warren Heustis & Son, Marshall	6 00
Second, Marshall F. Ewell, "	5 00
Third, George V. Fletcher, "	4 00
Fourth, I. E. Coburn, Jesse	3 00

Regular Prizes.

For the largest and best collection, not less than twenty baskets of two quarts each, and not less than five varieties, George F. Wheeler	25 00
Second, Isaac E. Coburn	20 00
Ten baskets, not less than three varieties, two quarts each, Isaac E Coburn	15 00
George V. Fletcher	12 00
Five baskets of one variety, two quarts each, Mrs. J. W. Clark, Pomfret, Conn.,	8 00
Two quarts of Belmont, J. W. Howard	4 00
Second, George V. Fletcher	3 00
Third. William Doran & Son	2 00
Bubach, I. E. Coburn	4 00
Second, Sumner Coolidge	3 00
Third, Oliver R. Robbins	2 00
Champion, Wilfred Wheeler	4 00
Second, George F. Wheeler	3 00
Charles Downing, Wilfred Wheeler	4 00
Second, George F. Wheeler	3 00
Third, William Doran & Son	2 00
Crescent, the Second prize to Isaac E. Coburn	3 00
Third, William C. Winter	2 00
Cumberland, the Third prize to George F. Wheeler	2 00
Jesse, Isaac E. Coburn	4 00
Second, George V. Fletcher	3 00
Third, William C. Winter	2 00
Leader, George V. Fletcher	4 00
Second, George F. Wheeler	3 00
Marshall, Hon. Joseph S. Fay	4 00
Second, E. W. Wood	3 00
Third, Isaac E. Coburn	2 00
Miner's Prolific, the Second prize to George F. Wheeler	2 00
Sharpless, the Third prize to William Doran & Son	2 00
Any other variety, Sumner Coolidge, Hersey	4 00
Second, Isaac E. Coburn, Haverland	3 00
Third, Mrs. J. W. Clark, "	2 00
Collection of not less than six varieties, one quart of each, George V. Fletcher	8 00
Second, Isaac E. Coburn	6 00
CHERRIES.— Two quarts of any variety, George V. Fletcher	4 00
Second, Edwin Hastings	3 00
Third, Joshua C. Stone	2 00
FOREIGN GRAPES.—Two bunches of any variety, Elisha S. Converse	6 00
Second, Winter Brothers	4 00
FORCED PEACHES.— Six specimens of any variety, William C. Winter	3 00

June 29.

Strawberries.— One quart of any variety, J. W. Howard	3 00
Second, Warren Heustis & Son	2 00
Third, Isaac E. Coburn	1 00
Cherries.— Black Tartarian, Leverett M. Chase	3 00
Second, James L. Duncan	2 00
Third, Charles B. Travis	1 00
Downer, Marshall W. Chadbourne	3 00
Any other variety, A. T. Brown, Reine Hortense	3 00
Second, Charles B. Travis, Elton	2 00
Third, Marshall W. Chadbourne, White Heart	1 00
Gratuity :—	
William Doran & Son, Raspberries	1 00

July 6.

Cherries.—Two quarts of any variety, Charles F. Curtis, Downer	3 00
Second, E. S. Chapell, Napoleon	2 00
Third, Charles F. Curtis, Hyde's Seedling	1 00
Raspberries.— Two quarts of any variety, William Doran & Son, Red Antwerp	3 00
Second, Josiah W. Talbot, Seedling	2 00
Currants.— Two quarts of any Red variety, W. N. Craig, Fay's	4 00
Second, William Doran & Son, Fay's	3 00
Third, " " " " Versaillaise	2 00
Two quarts of any White variety, Elisha S. Converse	3 00
Second, Samuel J. Trepess	2 00

July 13.

Raspberries.— Collection of not less than four varieties, two quarts of each, William Doran & Son	4 00
Two quarts of any variety, Elisha S. Converse	3 00
Second, Sumner Coolidge	2 00
Blackcaps.— Two quarts of any variety, Hon. John P. Spaulding	2 00
Currants.— One quart of Versaillaise, W. N. Craig	2 00
Second, Elisha S. Converse	1 00
One quart of any other Red variety, William C. Winter	2 00
Second, Hon. John P. Spaulding	1 00
One quart of any White variety, Elisha S. Converse	2 00
Second, Samuel J. Trepess	1 00
Gooseberries.— Two quarts of any Native variety, Joseph S. Chase, Triumph	3 00
Second, Amos Bates, Bates's Seedling	2 00
Third, E. W. Wood, " "	1 00

July 20.

Raspberries.—Two quarts of any variety, Hon. John P. Spaulding	3 00
Second, Mrs. E. J. Cutter	2 00
Third, Sumner Coolidge	1 00
Currants.—One quart of any Red variety, William Doran & Son	3 00
Second, W. N. Craig	2 00
Third, Elisha S. Converse	1 00
One quart of any White variety, Elisha S. Converse	2 00
Gooseberries.—Two quarts of any Foreign variety, Dr. Walter G. Kendall	3 00
Second, Benjamin P. Ware	2 00
Third, W. N. Craig	1 00

Gratuities:—

Rev. Calvin Terry, Pears	1 00
William C. Winter, Peaches	1 00

July 27.

Blackberries.—Two quarts of any variety, Marshall W. Chadbourne	3 00
Second, Rev. Calvin Terry	2 00
Apples.—Tetofsky, Samuel Hartwell	3 00
Second, Marshall W. Chadbourne	2 00
Pears.—Summer Doyenne, E. S. Converse	3 00
Second, Warren Fenno	2 00
Third, Charles N. Brackett	1 00
Any other variety, Mary Curtis, Giffard	3 00
Second, A. T. Brown, "	2 00
Third, William Milman "	1 00
Peaches.—Any variety, Charles S. Smith	3 00
Second, Nathaniel T. Kidder	2 00

Gratuities:—

Andrew Wellington, Apricots	1 00
Mrs. Frederick L. Ames, Nectarines	2 00
William C. Winter, Peaches	1 00

August 3.

Apples.—Red Astrachan, Samuel G. Damon	3 00
Second, Warren Fenno	2 00
Third, S. F. & F. L. Weston	1 00
Sweet Bough, Sumner Coolidge	3 00
Second, William T. Hall	2 00
Third, George V. Fletcher	1 00
Any other variety, Joshua C. Stone, Williams	3 00
Second, Sumner Coolidge, "	2 00
Third, P. G. Hanson, "	1 00

PEARS.—Giffard, Mary Curtis	3 00
Second, A. T. Brown	2 00
Third, Rufus T. Tobey	1 00
Any other variety, Sumner Coolidge, Clapp's Favorite	3 00
Second, A. T. Brown	2 00
Third, Elisha S. Converse	1 00
BLACKBERRIES.—Two quarts of any variety, Marshall W. Chadbourne	3 00
Second, Rev. Calvin Terry	2 00
PEACHES.—Any variety, Mrs. N. D. Harrington, Amsden	3 00
Second, Charles S. Smith, Alexander	2 00
Third, Mrs. N. D. Harrington, Alexander	1 00

Gratuities:—

William Everett, Seedling Gooseberry	1 00
Mrs. Frederick L. Ames, Nectarines	1 00

AUGUST 10.

APPLES.—Oldenburg, William T. Hall	3 00
Second, J. V. Fletcher	2 00
Any other variety, Joshua C. Stone, Williams	3 00
Second, Varnum Frost "	2 00
Third, Sumner Coolidge, "	1 00
PEARS.—Clapp's Favorite, George V. Fletcher	3 00
Second, Sumner Coolidge	2 00
Third, S. Klaus	1 00
Manning's Elizabeth, Elisha S. Converse	2 00
Second, Warren Fenno	1 00
Any other variety, Sumner Coolidge, Bartlett	2 00
Second, Samuel G. Damon, "	1 00
APRICOTS.—Any variety, Andrew Wellington, Large Early	3 00
Second, Andrew Wellington, Alexander	2 00
PEACHES.—Any variety, Sumner Coolidge, Early Rivers	3 00
Second, Leverett M. Chase, Early Rivers	2 00
Third, William C. Winter, Waterloo	1 00
Six specimens of cold house or pot culture, William C. Winter	3 00
FOREIGN GRAPES.—Two bunches of any variety, Winter Brothers, Muscat of Alexandria	5 00
Second, Winter Brothers, Black Hamburg	4 00

Gratuity:—

T. Carleton, Collection of Grapes	2 00

AUGUST 17.

APPLES.—Chenango, Samuel Hartwell	3 00
Williams, Joshua C. Stone	3 00
Second, Charles F. Curtis	2 00
Third, Varnum Frost	1 00

Any other variety, Warren Fenno, Summer Pippin	3 00
Second, Samuel G. Damon, Porter	2 00
Third, Samuel Hartwell, Bietigheimer	1 00
PEARS.— Rostiezer, S. F. & F. L. Weston	3 00
Second, Marshall W. Chadbourne	2 00
Third, Charles N. Brackett	1 00
Tyson, Leverett M. Chase	3 00
Second, Clifford Weld	2 00
Third, Warren Fenno	1 00
Any other variety, A. T. Brown	3 00
Second, Sumner Coolidge	2 00
Third, Samuel G. Damon	1 00
PEACHES.— Any variety, Sumner Coolidge	3 00
Second, William C. Winter	2 00
PLUMS.— Japanese, any variety, William C. Winter, Abundance	3 00
Second, Joseph S. Chase, Abundance	2 00
Any other variety, George V. Fletcher, Bradshaw	3 00
Second, Mrs. Mary T. Goddard "	2 00
Third, M. L. Whitney, Washington	1 00

AUGUST 24.

APPLES.— Foundling, the Second prize to Warren Fenno	2 00
Gravenstein, Samuel Hartwell	3 00
Second, Joshua C. Stone	2 00
Third, Charles S. Smith	1 00
Maiden's Blush, Dr. Walter G. Kendall	3 00
Second, Joshua C. Stone	2 00
Third, Warren Fenno	1 00
Porter, Sumner Coolidge	3 00
Second, Samuel G. Damon	2 00
Third, George V. Fletcher	1 00
Summer Pippin, Warren Fenno	3 00
Second, Samuel Hartwell	2 00
Any other variety, Samuel Hartwell, Bietigheimer	3 00
Second, Joshua C. Stone, Williams	2 00
Third, Warren Fenno, Garden Royal	1 00
PEARS.— Andrews, Elisha S. Converse	3 00
Second, Samuel G. Damon	2 00
Third, Joshua C. Stone	1 00
Bartlett, William Milman	3 00
Second, George V. Fletcher	2 00
Third, Samuel G. Damon	1 00
Boussock, Charles N. Brackett	3 00
Second, Charles F. Curtis	2 00
Third, Sumner Coolidge	1 00
Any other variety, A. T. Brown, Flemish Beauty	3 00
Second, Warren Fenno, Souvenir du Congrés	2 00
Third, George V. Fletcher, Clapp's Favorite	1 00

PEACHES.— Single dish, of any variety, Mrs. N. D. Harrington	3 00
Second, George W. Jameson	2 00
Third, John L. Bird	1 00
PLUMS.—Bradshaw, Mrs. Mary T. Goddard	3 00
Second, George V. Fletcher	2 00
Third, William H. Hunt	1 00
Any other variety, Mrs. Mary T. Goddard, Washington	3 00
Second, William C. Winter, Abundance	2 00
Third, Joseph S. Chase, "	1 00
NATIVE GRAPES.— Six bunches of any variety, Samuel G. Damon, Moore's Early	3 00

AUGUST 31.

Gratuity :—

Mrs. N. D. Harrington, Peaches	1 00

SEPTEMBER 3.

Gratuities : —

W. D. Hinds, Collection of Peaches	2 00
Mrs. J. W. Clark, Pomfret, Conn., Collection of Foreign Grapes	5 00

SEPTEMBER 14.

APPLES.— Gravenstein, Samuel Hartwell	3 00
Second, William T. Hall	2 00
Third, Charles S. Smith	1 00
Maiden's Blush, Joshua C. Stone	3 00
Second, Thomas L. Perkins	2 00
Third, Warren Fenno	1 00
Porter, George V. Fletcher	3 00
Second, Sumner Coolidge	2 00
Third, Samuel G. Damon	1 00
Any other variety, Samuel Hartwell, Stump	3 00
Second, Warren Fenno, Washington Strawberry	2 00
Third, P. G. Hanson, Mackintosh	1 00
CRAB APPLES.— Twenty-four specimens, Transcendent, Warren Fenno	2 00
Second, Mrs. N. D. Harrington	1 00
Any other variety, Marshall W. Chadbourne, Hyslop	2 00
Second, Joshua C. Stone, Hyslop	1 00
PEARS.— Bartlett, William Milman	3 00
Second, George V. Fletcher	2 00
Third, Mrs. N. D. Harrington	1 00
Belle Lucrative, Elisha S. Converse	3 00
Second, G. L. Brown	2 00
Third, Mrs. Mary Langmaid	1 00
Boussock, Warren Fenno	3 00
Second, Charles E. Swain	2 00
Third, Charles N. Brackett	1 00

Hardy, Charles F. Curtis	3 00
Second, William S. Janvrin	2 00
Third, Warren Fenno	1 00
Paradise of Autumn, William Milman	3 00
Second, Warren Heustis & Son	2 00
Third, William H. Hunt	1 00
Souvenir du Congrés, A. T. Brown	3 00
Second, Dr. Walter G. Kendall	2 00
Third, Charles N. Brackett	1 00
Any other variety, William Milman, Seckel	3 00
Second, C. A. Jones, Louise Bonne of Jersey	2 00
Third, Warren Fenno, Pratt	1 00
PEACHES.— Crawford's Early, P. G. Hanson	3 00
Second, Samuel G. Damon	2 00
Third, Mrs. Mary T. Goddard	1 00
Foster, Mrs. Mary Langmaid	3 00
Second, Sumner Coolidge	2 00
Third, P. G. Hanson	1 00
Oldmixon Freestone, Sumner Coolidge	3 00
Second, W. D. Hinds	2 00
Third, Charles S. Smith	1 00
Stump the World, Mrs. N. D. Harrington	3 00
Second, Leverett M. Chase	2 00
Third, W. D. Hinds	1 00
Any other variety, W. D. Hinds, Crosby	3 00
Second, Mrs. N. D. Harrington, Seedling	2 00
Third, Charles S. Smith, Susquehanna	1 00
PEACHES, ORCHARD HOUSE CULTURE.— Any variety, Joseph H. White	4 00
Second, William C. Winter	3 00
NECTARINES.— Any variety of outdoor culture, C. C. Donnell	2 00
PLUMS.— Imperial Gage, George V. Fletcher	3 00
Jefferson, Charles F. Curtis	3 00
Lombard, George V. Fletcher	3 00
Second, P. G. Hanson	2 00
Third, Samuel G. Damon	1 00
Any other variety, Mrs. Mary T. Goddard, Green Gage	3 00
Second, Mrs. Mary T. Goddard	2 00
Third, " " " "	1 00
NATIVE GRAPES.— August Rose, Joshua C. Stone	3 00
Second, Horace Carlton	2 00
Cottage, Benjamin G. Smith	3 00
Eumelan, " " "	3 00
Second, Samuel G. Damon	2 00
Massasoit, F. J. Kinney	3 00
Second, Samuel G. Damon	2 00

Moore's Early, Mrs. Mary T. Goddard	3 00
Second, Benjamin G. Smith	2 00
Third, Samuel G. Damon	1 00
Any other variety, F. J. Kinney, Worden	3 00
Second, Benjamin G. Smith, "	2 00
Third, Samuel G. Damon, Delaware	1 00
Any variety from girdled vines, F. J. Kinney, Worden	3 00

Gratuity: —

W. D. Hinds, Collection of Peaches	2 00

SEPTEMBER 21.

Gratuity: —

Joseph S. Chase, Collection of Grapes	3 00

ANNUAL EXHIBITION OF FRUITS AND VEGETABLES.

OCTOBER 2 AND 3.

Special Prizes.

Samuel Appleton Fund.

APPLES.— Baldwin, Sumner Coolidge	5 00
Hubbardston, Samuel Hartwell	5 00
PEARS.— Bosc, Samuel G. Damon	5 00
Sheldon, " " "	5 00

Benjamin V. French Fund.

APPLES.— Gravenstein, Samuel Hartwell	5 00
Rhode Island Greening, George V. Fletcher	5 00

Marshall P. Wilder Fund.

PEARS.— Anjou, A. T. Brown	4 00
Second, Mrs. Mary Langmaid	3 00
Third, Samuel G. Damon	2 00
Fourth, William Patterson	1 00
Bartlett, George V. Fletcher	4 00
Second, Samuel G. Damon	3 00
Third, Varnum Frost	2 00
Fourth, Samuel Lake	1 00
GRAPES.— Concord, George W. Jameson	3 00
Second, Samuel G. Damon	2 00
Worden, F. J. Kinney	3 00
Second, Benjamin G. Smith	2 00
Third, William C. Winter	1 00

Special Prizes offered by the Society.

PEARS.— Anjou, Samuel W. Damon	5 00
Seckel, A. T. Brown	5 00
PEACHES.— Any variety, Mrs. Mary T. Goddard	5 00
NATIVE GRAPES.— Twelve bunches of any variety, Benjamin G. Smith	5 00

Regular Prizes, Theodore Lyman Fund.

APPLES.— Baldwin, Joshua C. Stone	4 00
Second, E. P. Tewksbury	3 00
Third, Sumner Coolidge	2 00
Dutch Codlin, the Second prize to Warren Fenno	1 00
Fall Orange or Holden, Samuel Hartwell	3 00
Fameuse, Joshua Coolidge	3 00
Second, William Milman	2 00
Third, Sumner Coolidge	1 00
Gloria Mundi, Samuel Hartwell	3 00
Second, Mrs. J. W. Clark	2 00
Golden Russet, H. E. Rich	2 00
Gravenstein, Samuel Hartwell	4 00
Second, William T. Hall	3 00
Third, B. N. Moore	2 00
Hubbardston, Joshua C. Stone	4 00
Second, Samuel Hartwell	3 00
Third, Marshall W. Chadbourne	2 00
Hunt Russet, E. T. Creesy	3 00
Second, Samuel Hartwell	2 00
Mackintosh, Everett Smith	3 00
Second, Samuel Hartwell	2 00
Third, C. M. Handley	1 00
Maiden's Blush, Warren Fenno	2 00
Second, T. L. Perkins	1 00
Mother, Warren Fenno	3 00
Northern Spy, George V. Fletcher	3 00
Second, Samuel G. Damon,	2 00
Third, C. M. Handley	1 00
Porter, George V. Fletcher	3 00
Second, Samuel G. Damon	2 00
Third, C. M. Handley	1 00
Pound Sweet, George V. Fletcher	3 00
Rhode Island Greening, Sumner Coolidge	4 00
Second, Joshua C. Stone	3 00
Third, Arthur F. Coolidge	2 00
Roxbury Russet, Joshua C. Stone	4 00
Second, William C. Clapp	3 00
Third, Sumner Coolidge	2 00

Sutton, the Second prize to H. E. Rich	2 00
Tompkins King, Mrs. H. A. Small	3 00
Palmer, Samuel Hartwell	3 00
Washington, Strawberry, Joshua C. Stone	2 00
Wealthy, Samuel Hartwell	3 00
Any other variety, Benjamin L. Priest, New York Pippin	3 00
Second, William Everett, Jacobs Sweet	2 00
Third, Samuel Hartwell, Yellow Bellflower	1 00
CRAB APPLES.— Hyslop, Joshua C. Stone	2 00
Second, Marshall W. Chadbourne	1 00
Any other variety, Samuel H. Warren	2 00

Society's Prizes.

PEARS.— Angouleme, Samuel G. Damon	4 00
Second, A. T. Brown	3 00
Third, Mary Curtis	2 00
Fourth, Varnum Frost	1 00
Bosc, Richard Polson	4 00
Second, Mrs. George S. Harwood	3 00
Third, A. T. Brown	2 00
Fourth, Sumner Coolidge	1 00
Clairgeau, Samuel G. Damon	3 00
Second, Willlam T. Hall	2 00
Third, Willard P. Plimpton	1 00
Comice, A. T. Brown	3 00
Second, William Everett	2 00
Third, Charles N. Brackett	1 00
Dana's Hovey, A. T. Brown	4 00
Second, Willard P. Plimpton	3 00
Third, Charles E. Swain	2 00
Fourth, E. W. Wood	1 00
Diel, Charles E. Swain	3 00
Second, A. T. Brown	2 00
Third, Samuel G. Damon	1 00
Fulton, Elisha S. Converse	3 00
Second, S. F. & F. L. Weston	2 00
Third, John L. Bird	1 00
Hardy, Charles F. Curtis	3 00
Second, William Milman	2 00
Third, Warren Fenno	1 00
Howell, Benjamin G. Smith	3 00
Second, Joseph C. Stone	2 00
Third, Mrs. Mary Langmaid	1 00
Josephine of Malines, Samuel G. Damon	3 00
Second, Warren Fenno	2 00
Third, John L. Bird	1 00

Lawrence, A. T. Brown	3 00
Second, Marshall W. Chadbourne	2 00
Third, William T. Hall	1 00
Louise Bonne of Jersey, Aaron S. McIntosh	3 00
Second, Thomas M. Davis	2 00
Third, John W. Martin	1 00
Marie Louise, Charles E. Swain	3 00
Second, Samuel G. Damon	2 00
Third, Sumner Coolidge	1 00
Merriam, Sumner Coolidge	3 00
Second, Samuel G. Damon	2 00
Third, Warren Heustis & Son	1 00
Onondaga, John J. Merrill	3 00
Second, Leverett M. Chase	2 00
Third, Warren Fenno	1 00
Seckel, J. McEttrick	4 00
Second, C. H. Plimpton	3 00
Third, Charles E. Swain	2 00
Fourth, A. T. Brown	1 00
Sheldon, Samuel G. Damon	4 00
Second, Mrs. N. D. Harrington	3 00
Third, Sumner Coolidge	2 00
Fourth, Mrs. Mary Langmaid	1 00
Souvenir du Congrés, A. T. Brown	3 00
Third, Marshall W. Chadbourne	1 00
St. Michael Archangel, Benjamin G. Smith	3 00
Second, Warren Heustis & Son	2 00
Third, Warren Fenno	1 00
Superfin, Sumner Coolidge	3 00
Second, Warren Fenno	2 00
Third, Samuel G. Damon	1 00
Urbaniste, Charles E. Swain	3 00
Second, Mrs. Emmons	2 00
Third, Elisha S. Converse	1 00
Vicar, A. T. Brown	3 00
Second, Elisha S. Converse	2 00
Third, Sumner Coolidge	1 00
Winter Nelis, Thomas M. Davis	3 00
Second, A. T. Brown	2 00
Third, Clifford Weld	1 00
Any other variety, William C. Clapp, Harris	3 00
Second, Warren Fenno, Pratt	2 00
Third, Elisha S. Converse, Kingsessing	1 00
QUINCES.— Orange, A. F. Coolidge	3 00
Second, George V. Fletcher	2 00
Third, Mrs. Mary T. Goddard	1 00

Pear, George V. Fletcher	3 00
Second, Benjamin G. Smith	2 00
Rea, George S. Curtis	3 00
Second, Mrs. George S. Harwood	2 00
Third, Mrs. Mary T. Goddard	1 00
Any other variety, Charles S. Smith	3 00
Second, Benjamin G. Smith	2 00
Third, Charles B. Travis	1 00
PEACHES.— Crawford's Late, Francis Blake	3 00
Second, Samuel Hartwell	2 00
Third, Mrs. Mary T. Goddard	1 00
Any other variety, W. D. Hinds	3 00
Second, Sumner Coolidge	2 00
Third, Warren Heustis & Son	1 00
PEACHES, ORCHARD HOUSE CULTURE, D. B. Fearing, Newport, R. I.	4 00
PLUMS.— Coe's Golden Drop, Mrs. Mary T. Goddard	2 00
Any other variety, George V. Fletcher	2 00
NATIVE GRAPES.— Brighton, Benjamin G. Smith	3 00
Second, Marshall W. Chadbourne	2 00
Third, Mrs. Mary T. Goddard	1 00
Delaware, Joseph S. Chase	3 00
Second. Warren Fenno	2 00
Third, Benjamin G. Smith	1 00
Herbert, Joseph S. Chase	3 00
Third, Samuel G. Damon	1 00
Iona, Joseph S. Chase	3 00
Second, Samuel G. Damon	2 00
Third, Benjamin G. Smith	1 00
Lindley, Joseph S. Chase	3 00
Second, Benjamin G. Smith	2 00
Niagara, Thomas H. Talbot	3 00
Second, Benjamin G. Smith	2 00
Third, George W. Jameson	1 00
Pocklington, Samuel H. Warren	3 00
Second, M. Houghton	2 00
Third, P. G. Hanson	1 00
Prentiss, Benjamin G. Smith	3 00
Second, Joseph S. Chase	2 00
Third, Samuel G. Damon	1 00
Wilder, Benjamin, G. Smith	3 00
Worden, F. J. Kinney	3 00
Second, Benjamin G. Smith	2 00
Third, William C. Winter	1 00
Any other variety, Benjamin G. Smith	3 00
Second, Benjamin G. Smith	2 00
Third, Mrs. Mary Haller	1 00

FOREIGN GRAPES.— Four varieties, two bunches of each, Mrs. J. W. Clark, Pomfret, Conn.,	10 00
Second, Benjamin G. Smith	8 00
Black Hamburg, two bunches, Mrs. J. W. Clark	5 00
Muscat of Alexandria, Joseph H. White	5 00
Any other variety, Mrs. J. W. Clark	5 00
Second, Elisha S. Converse	4 00
CRANBERRIES.— Half-peck, L. J. Fosdick	3 00
Second, L. J. Fosdick	2 00
Third, " "	1 00

Gratuities :—

Mrs. J. W. Clark, Collection of Grapes	3 00
Joseph S. Chase, " " "	1 00
W. D. Hinds, " " Peaches	2 00

EXHIBITION OF WINTER FRUITS AND VEGETABLES.

NOVEMBER 16.

Benjamin V. French Fund.

APPLES.— Baldwin, Joshua C. Stone	5 00
Hubbardston, Samuel Hartwell	5 00

Society's Prizes.

APPLES.— Baldwin, Samuel G. Damon	3 00
Second, Joshua C. Stone	2 00
Third, J. V. Fletcher	1 00
Fletcher Russet, Amos T. Leavitt	3 00
Hubbardston, John Parker	3 00
Second, Joshua C. Stone	2 00
Third, Samuel Hartwell	1 00
Hunt Russet, Samuel Hartwell	3 00
Second, Dr. Walter G. Kendall	2 00
Northern Spy, George V. Fletcher	3 00
Second, Samuel Hartwell	2 00
Third, William T. Hall	1 00
Rhode Island Greening, George V. Fletcher	3 00
Second, Joshua C. Stone	2 00
Third, Samuel Hartwell	1 00
Roxbury Russet, Frank M. Stone	3 00
Second, Luther Woodbury	2 00
Third, Joshua C. Stone	1 00

Any other variety, Samuel Hartwell, Mackintosh	3 00
Second, George V. Fletcher, Pound Sweet	2 00
Third, Samuel Hartwell, Gloria Mundi	1 00
PEARS.—Angouleme, A. T. Brown	4 00
Second, Samuel G. Damon	3 00
Third, Mary Curtis	2 00
Fourth, Varnum Frost	1 00
Anjou, A. T. Brown	4 00
Second, Samuel G. Damon	3 00
Third, Mrs. S. Klaus	2 00
Fourth, Charles E. Swain	1 00
Clairgeau, Samuel G. Damon	3 00
Second, William T. Hall	2 00
Third, Joshua C. Stone	1 00
Comice, A. T. Brown	4 00
Second, William Everett	3 00
Third, S. F. & F. L. Weston	2 00
Fourth, Samuel G. Damon	1 00
Dana's Hovey, A. T. Brown	4 00
Second, Samuel G. Damon	3 00
Third, Charles E. Swain	2 00
Fourth, George V. Fletcher	1 00
Diel, Samuel G. Damon	3 00
Second, A. T. Brown	2 00
Third, Charles E. Swain	1 00
Glout Morceau, Mary Curtis	3 00
Second, Warren Fenno	2 00
Third, Clifford Weld	1 00
Josephine of Malines, Samuel G. Damon	3 00
Second, Warren Fenno	2 00
Third, John L. Bird	1 00
Langelier, Thomas M. Davis	3 00
Second, A. T. Brown	2 00
Third, Mrs. S. Klaus	1 00
Lawrence, A. T. Brown	3 00
Second, Mrs. Emmons	2 00
Third, Mrs. A. A. Johnson	1 00
Vicar, A. T. Brown	3 00
Second, John J. Merrill	2 00
Third, Elisha S. Converse	1 00
Winter Nelis, Thomas M. Davis	3 00
Second, A. T. Brown	2 00
Third, Mrs. Emmons	1 00
Any other variety, Samuel G. Damon, Sheldon	3 00
Second, A. T. Brown, Bosc	2 00
Third, Charles E. Swain, Seckel	1 00

FOREIGN GRAPES. — Two bunches of any variety, Elisha S. Converse, Gros Colman	4 00
Second, Elisha S. Converse, Alicante	3 00
Gratuities: —	
Samuel G. Damon, Collection of Pears	5 00
L. J. Fosdick, Cranberries	2 00

SOCIETY'S SILVER MEDAL.

September 3. Mrs. J. W. Clark, Pomfret, Conn., Golden Hamburg Grapes.

FIRST CLASS CERTIFICATE OF MERIT.

Annual Exhibition of Fruits and Vegetables, October 2 and 3. Ward D. Gunn, Cliftondale, N.Y., Alice Grapes.

REPORT

OF THE

COMMITTEE ON VEGETABLES,

FOR THE YEAR 1895.

By CHARLES N. BRACKETT, Chairman.

The exhibitions of vegetables during the past year, taking the season as a whole, have been of unusual excellence. For beauty, evenness, and smoothness of growth, it was the generally expressed opinion that the specimens shown have rarely if ever been excelled at any of our former exhibitions.

Competition for the prizes has been more active and close than in any former year within the memory of the present Committee. There has also been a large increase in the number of contributors.

On nearly every Saturday from January to November, whether it has been prize day or not, choice specimens of vegetables either from the forcing house or open ground have been on exhibition, thereby adding to the interest in our weekly shows.

The constant and increasing interest manifested by contributors and the public generally, in this department of our exhibitions, has been duly appreciated by your Committee, and should be highly gratifying to the Society at large.

The opening Prize Exhibition of the year was that for Forced Vegetables, January 12, at which time there were shown specimens of Rhubarb, Radishes, Cucumbers, Lettuce, Mushrooms, Parsley, and Tomatoes, all of which were of superior quality and growth.

From this time to the Annual Exhibition our weekly shows have been such as not only to attract and gratify visitors, but also to

reflect credit upon contributors and the Society. From year to year marks of improvement are visible, and give evidence of a constantly growing and continued progress on the part of the cultivator.

On May 4, the first Asparagus of the season was shown by Varnum Frost, who secured the first prize. Fine specimens were also exhibited on the following prize day by P. G. Hanson and Hon. George Heywood, who were awarded prizes in the order named.

Peas were shown for the first time June 15, F. C. Goddard being the exhibitor. From this date on through the season peas were shown in liberal quantity and variety. The leading kinds were American Wonder, Advancer, Stratagem, Heroine, and Champion. A new and very handsome pea belonging to the same class as the Heroine and Stratagem was shown by Samuel J. Trepess, and was much admired. It was called Juno.

With many growers the Heroine is taking the place of the Stratagem on account of the difficulty of procuring pure seed of that variety, which of late appears to be badly mixed and unreliable. It is to be regretted that so fine a pea should be allowed to run out for want of care in the selection and growing of stock seed.

Tomatoes of outdoor culture were shown for the first time July 13, Joshua C. Stone being awarded the first prize for the Boston Market. Fine specimens of May's Favorite and Paragon were shown on the same date.

The cultivation and development of the different varieties of the Tomato may be said to have approached, if not to have reached, perfection. In form, quality, or size there appears to be little to be desired. If any further improvement is possible it would seem to be in the way of earliness, but we doubt whether much more can be gained in that direction. The experience of the past ten or more years shows that we have about reached the limit.

A new feature, and one in which the visiting public appears to be deeply interested at the present time, has been the introduction at our weekly shows of large collections of our Native Mushrooms, both edible and noxious. The larger portion of the Mushroom family are said to be wholesome and nutritious, but because of the prevailing ignorance in regard to them, deaths from eating those which are poisonous are of not infrequent occurrence, so that great care and experience are requisite to discriminate those

which can be eaten with safety. It is useless to tell an ignorant person how to distinguish a poisonous from a wholesome mushroom. This knowledge can be safely gained only by learning from those who know. Until such knowledge is acquired we can only advise the masses to eat nothing but the one which everybody is supposed to have learned to be the good Mushroom, *(Agaricus campestris)* and the only one which is generally grown artificially.

The largest exhibition of Native Mushrooms was made at the weekly show, July 27. The contributors were Hollis Webster, Annie M. Livsey of Crompton, R. I., Joseph H. Woodford, and William C. Bates. The collection of Mr. Webster was a very extensive one, comprising a large number of named specimens both edible and noxious. On August 10, Charles E. Richardson showed a good collection, and Ellen N. Rumrill another October 19.

In view of the interest manifested both by members of the Society and visitors, in acquiring a better knowledge of our Native Mushrooms, it has been thought advisable to offer prizes the coming year for the best collection of named Edible Native Mushrooms. For further information those interested are referred to the Schedule of Prizes for 1896.

At the Annual Exhibition were to be seen a fine collection of vegetables of all the best varieties, giving proof of the highest cultivation, and displayed in tempting profusion.

The show of Potatoes at this time was the largest and best the Society has ever made. There were one hundred and six dishes in all and not a really poor one among the lot. The first prize for the best four varieties was awarded to C. H. Thomas of New Hampshire. His specimens were splendidly grown and much admired.

The show of Tomatoes at this exhibition was equally fine and full,—one of the best ever made so late in the season. The whole number of dishes was eighty-seven. Hon. Aaron Low was the largest contributor, showing some twenty varieties. The first prize for the best three varieties was awarded to Varnum Frost.

At this exhibition we were indebted to William J. Martin, gardener to Nathaniel T. Kidder, for a large collection comprising upwards of sixty varieties of well-grown vegetables, tastefully arranged and forming an interesting feature of the show.

The show of Cauliflowers, Celery, and Squashes was also unusually fine, the exhibits of Cauliflowers by A. M. Knowlton, William H. Teele, and B. J. Souza, and of Celery by Warren Heustis & Son and Arthur F. Coolidge being particularly worthy of mention.

During the past exhibition season more of the prizes offered in the Schedule have been competed for and taken than in any previous year, the full amount appropriated for Vegetables having been awarded.

The attention of contributors is called to changes and alterations in the Schedule of Prizes for the coming year.

All of which is respectfully submitted,

For the Committee,

C. N. Brackett,

Chairman.

PRIZES AND GRATUITIES AWARDED FOR VEGETABLES.

January 5.

Gratuities:—

Francis Brown Hayes, Celery	$1 00
Norris Comley, Rhubarb	1 00

January 12.

Radishes.—Four bunches of any variety, Joshua C. Stone	3 00
Second, Warren Heustis & Son	2 00
Third, Charles A. Learned	1 00
Cucumbers.—Pair of any variety, John L. Gardner	3 00
Lettuce.—Four heads of Tennisball, H. R. Kinney	2 00
Second, W. N. Craig	1 00
Parsley.—Two quarts, H. R. Kinney	3 00
Second, W. N. Craig, Matchless	2 00
Third, W. N. Craig, Emerald	1 00
Mushrooms.—Twenty-four specimens, George M. Anderson	3 00
Tomatoes.—Twelve specimens, Winter Brothers, Essex	3 00
Second, W. N. Craig, Chemin	2 00
Third, Winter Brothers, President Cleveland	1 00

Gratuities:—

Warren Heustis & Son, Celery	2 00
Francis Brown Hayes, "	1 00
Norris Comley, Rhubarb	1 00

January 19.

Gratuity:—

Norris Comley, Rhubarb	1 00

February 2.

Radishes.—Four bunches of any variety, Joshua C. Stone	3 00
Third, W. N. Craig	1 00
Cucumbers.—Pair of any variety, John L. Gardner	3 00
Lettuce.—Four heads of Tennisball, the Second prize to Joshua C. Stone	3 00
Rhubarb.—Twelve stalks, Norris Comley	3 00
Second, C. F. Smith	2 00
Third, George Sanderson	1 00
Tomatoes.—Twelve specimens, Winter Brothers, Chemin	3 00
Second, W. N. Craig	2 00
Third, Winter Brothers, Essex	1 00

Gratuities : —

Warren Heustis & Son, Celery	1 00
William Miller, Mushrooms	1 00

FEBRUARY 16.

Gratuity : —

Warren Heustis & Son, Celery	1 00

FEBRUARY 23.

Gratuities : —

Warren Heustis & Son, Celery	1 00
Herbert F. Calder, Rhubarb	1 00
Charles A. Learned, Lettuce	1 00

MARCH 2.

Gratuity : —

Warren Heustis & Son, Celery	1 00

MARCH 9.

Gratuities : —

David Nevins, Cauliflowers	1 00
Samuel J. Trepess, Lettuce	1 00

MARCH 16.

Gratuity : —

John Lyons, Lettuce	1 00

SPRING EXHIBITION.

MARCH 26, 27, 28, AND 29.

William J. Walker Fund.

RADISHES.— Four bunches of Turnip Rooted, H. R. Kinney	3 00
Second, Joshua C. Stone	2 00
Four bunches of Long Scarlet, H. R. Kinney	3 00
Second, William C. Winter	2 00
Third, John L. Bird	1 00
CELERY.— Four roots, Warren Heustis & Son, Perle le Grand	3 00
Second, Warren Heustis & Son, Boston Market	2 00
LETTUCE.— Four heads of Tennisball, H. R. Kinney	3 00
Second, Charles A. Learned	2 00
Third, Nathaniel T. Kidder	1 00
PARSLEY.— Two quarts, H. R. Kinney	2 00
Second, George Sanderson	1 00
MUSHROOMS.— Twenty-four specimens, Mrs. E. M. Gill	3 00

Rhubarb.— Twelve stalks, Norris Comley	3 00
Second, George Sanderson	2 00
Tomatoes.— Twelve specimens, Winter Brothers, Chemin	3 00
Second, Winter Brothers, Essex	2 00
Gratuities : —	
David Nevins, Celery	1 00
" " Mushrooms	1 00
" " Cauliflowers	1 00
John L. Gardner, Cucumbers	1 00
Charles A. Learned, Beets	1 00
Warren Heustis & Son, Collection	1 00

April 6.

Cucumbers.— Pair of White Spine, Charles Cummings	3 00
Mushrooms.— Twenty-four specimens, the Second prize to Mrs. E. M. Gill	2 00
Gratuity : —	
Warren Heustis & Son, Radishes	1 00

April 13.

Gratuity : —	
Warren Heustis & Son, Radishes	1 00

April 20.

Gratuity : —	
Warren Heustis & Son, Dandelions	1 00

MAY EXHIBITION.

May 4.

Asparagus.— Four bunches, Varnum Frost	3 00
Cucumbers.— Pair of White Spine, Varnum Frost	3 00
Second, Walter Russell	2 00
Third, Charles Cummings	1 00
Any other variety, the Third prize to John L. Gardner	1 00
Spinach.— Peck, Warren Heustis & Son	3 00
Dandelions.— Peck, Varnum Frost	2 00
Second, Warren Heustis & Son	1 00
Lettuce.— Four heads, John L. Gardner	3 00
Rhubarb.— Twelve stalks, Varnum Frost	3 00
Second, P. G. Hanson	2 00
Third, Warren Heustis & Son	1 00

Gratuities:—

Varnum Frost, Cucumbers	1 00
John L. Gardner, Lettuce	1 00
W. N. Craig, Tomatoes and Parsley	3 00
Walter Russell, Radishes	1 00
Warren Heustis & Son, Radishes	1 00
Mrs. Mary T. Goddard, Collection	2 00

MAY 11.

Gratuities:—

P. G. Hanson, Asparagus and Rhubarb	2 00
Hon. George Heywood, Asparagus	1 00
Walter Russell, Cucumbers and Radishes	1 00
Warren Heustis & Son, Collection	2 00

MAY 18.

Gratuities:—

Mrs. Mary T. Goddard, Beets and Carrots	2 00
Warren Heustis & Son, Radishes	1 00
Hon. George Heywood, Asparagus	1 00
W. N. Craig, Collection of Tomatoes, etc.	3 00
Walter Russell, Collection	2 00

MAY 25.

Gratuities:—

W. N. Craig, Cucumbers and Tomatoes	2 00
John L. Gardner, Cabbages and Cucumbers	2 00
George Heywood, Asparagus	1 00
Warren Heustis & Son, Collection	3 00
Walter Russell, "	3 00

JUNE 1.

Gratuities:—

John L. Gardner, Cauliflowers	1 00
Warren Heustis & Son, Collection	2 00
P. G. Hanson, "	2 00
Walter Russell, "	1 00

RHODODENDRON SHOW.

JUNE 6 AND 7.

BEETS.—Twelve specimens, Mrs. Mary T. Goddard	3 00
Second, Joshua C. Stone	2 00
CARROTS.—Twelve Short Scarlet, W. N. Craig	3 00
Second, Warren Heustis & Son	2 00
Third, Mrs. Mary T. Goddard	1 00

RADISHES.— Four bunches of Turnip Rooted, Walter Russell	3 00
Second, Warren Heustis & Son	2 00
Third, Walter Russell	1 00
Four bunches of Long Scarlet, Warren Heustis & Son	3 00
ASPARAGUS.— Four bunches, P. G. Hanson	3 00
Second, Hon. George Heywood	2 00
Third, J. Fuller	1 00
CUCUMBERS.— Pair, grown under glass, Warren Heustis & Son	3 00
Second, Charles Cummings	2 00
Third, Walter Russell	1 00
LETTUCE.— Four heads, Joshua C. Stone	3 00
Second, Sumner Coolidge	2 00
Third, George Winn	1 00
RHUBARB.— Twelve stalks, P. G. Hanson	3 00
Second, Mrs. Mary T. Goddard	2 00
Third, Samuel J. Trepess	1 00
TOMATOES.— Twelve specimens, W. N. Craig	3 00
Second, Moses Stevens, Nicholson's Hybrid	2 00
Third, " " May's Favorite	1 00

Gratuities:—

Warren Heustis & Son, Collection	3 00
John L. Gardner, "	3 00
W. N. Craig, "	2 00
Walter Russell, "	2 00
H. R. Kinney, "	2 00

JUNE 15.

Gratuities:—

John L. Gardner, Cauliflowers and Peas	2 00
F. E. Goddard, Stratagem Peas	1 00
Hon. Joseph S. Fay, Collection	4 00
Walter Russell, "	3 00
Warren Heustis & Son, "	3 00

ROSE AND STRAWBERRY SHOW.

JUNE 20 AND 21.

BEETS.— Twelve Summer Turnip Rooted, Warren Heustis & Son	$3 00
Second, Sumner Coolidge	2 00
Third, Joshua C. Stone	1 00
ONIONS.— Twelve specimens, Walter Russell	3 00
Second, Sumner Coolidge	2 00
Third, Warren Heustis & Son	1 00

CUCUMBERS.— Pair of White Spine, Warren Heustis & Son	3 00
Second, Charles A. Learned	2 00
Third, Walter Russell	1 00
Any other variety, W. N. Craig	3 00
CABBAGES.— Three of any variety, trimmed, Hon. Joseph S. Fay	3 00
Third, Warren Heustis & Son	1 00
LETTUCE.— Four heads of any variety, Sumner Coolidge	3 00
Second, Warren Heustis & Son	2 00
Third, E. C. Lewis	1 00
PEAS.— Half-peck of any variety, P. G. Hanson	3 00
Second, Hon. Joseph S. Fay	2 00
Third, Charles A. Learned	1 00

Gratuities :—

Hon. Joseph S. Fay, Cauliflowers	1 00
W. N. Craig, Collection of Tomatoes	2 00
Winter Brothers " "	1 00
Sumner Coolidge, Collection	2 00
P. G. Hanson, "	1 00
Warren Heustis & Son, Collection	1 00

JUNE 29.

POTATOES.— Twelve specimens, Hon. Joseph S. Fay, Hebron	3 00
Second, Hon. Joseph S. Fay, New Queen	2 00
Third, Hon. Joseph S. Fay, Early Rose	1 00
ONIONS.— Twelve specimens, Sumner Coolidge	2 00
Second, Hon. Joseph S. Fay	1 00
SQUASHES.— Four Long Warted, Joshua C. Stone	2 00
Second, Sumner Coolidge	1 00
Four Scalloped, Sumner Coolidge	2 00
Second, Joshua C. Stone	1 00
CABBAGES.— Three of any variety, trimmed, Hon. Joseph S. Fay, Wakefield	3 00
Second, Hon. Joseph S. Fay, Wyman	2 00
Third, Warren Heustis & Son, All Seasons	1 00
PEAS.— Half-peck of American Wonder, Hon. Joseph S. Fay	3 00
Any other variety, Isaac E. Coburn, Advance	3 00
Second, Hon. Joseph S. Fay	2 00
Third, Joshua C. Stone	1 00

Gratuities :—

John P. Spaulding, Beans	1 00
Warren Heustis & Son, Collection	2 00
Sumner Coolidge, "	2 00
Walter Russell "	1 00

JULY 6.

SQUASHES.— Four Long Warted, Sumner Coolidge	2 00
Second, Walter Russell	1 00
BEANS.— Half-peck of String, of any variety, Joshua C. Stone, Cranberry	3 00
Second, Warren Heustis & Son, Cranberry	2 00
Third, Sumner Coolidge, Hybrid	1 00
PEAS.— Half-peck of Stratagem, John P. Spaulding	3 00
Half-peck of any other variety, Isaac E. Coburn	3 00
Second, Hon. Aaron Low	2 00

Gratuities :—

W. N. Craig, Tomatoes	2 00
Moses Stevens, "	1 00
Samuel J. Trepess, Tomatoes	1 00
Warren Heustis & Son, Collection	2 00
Sumner Coolidge, "	2 00
Walter Russell, "	1 00

JULY 13.

CABBAGES.— Three Drumhead, trimmed, Warren Heustis & Son, All Seasons	3 00
Second, Warren Heustis & Son, Johnson's No. 2	2 00
BEANS.— Half-peck of Cranberry, Joshua C. Stone	3 00
Second, Warren Heustis & Son	2 00
Third, Sumner Coolidge	1 00
PEAS.— Half-peck of any variety, Isaac E. Coburn, Heroine	3 00
Second, Samuel J. Trepess, Juno	2 00
Third, Isaac E. Coburn, Advancer	1 00
SWEET CORN.— Twelve ears, Sumner Coolidge, Hybrid	3 00
Second, Sumner Coolidge, Corey	2 00
Third, Joshua C. Stone, "	1 00
TOMATOES.— Open culture, twelve specimens, Joshua C. Stone, Boston Market	3 00
Second, Samuel J. Trepess, Paragon	2 00
Third, Samuel J. Trepess, May's Favorite	1 00

Gratuities :—

Walter Russell, Cucumbers	1 00
Sumner Coolidge, Collection	3 00
Warren Heustis & Son, "	2 00
W. N. Craig, "	1 00

JULY 20.

POTATOES.— Twelve specimens, Hon. Joseph S. Fay, Rose,	3 00
Second, Hon. Joseph S. Fay, Hebron	2 00
Third, Hon. Joseph S. Fay, Savoy	1 00

LETTUCE.— Four heads of any variety, Warren Heustis & Son	3 00
Second, Sumner Coolidge	2 00
Third, George F. Stone	1 00
SWEET CORN.— Twelve ears, Sumner Coolidge, Hybrid	3 00
Second, Sumner Coolidge, Corey	2 00
Third, Joshua C. Stone, "	1 00
TOMATOES.— Open culture, twelve specimens, Joshua C. Stone, Boston Market	3 00
Second, Samuel J. Trepess, Acme	2 00
Third, W. N. Craig	1 00

Gratuities: —

Walter Russell, Cucumbers	1 00
Elias Sprague, Celery	2 00
Nathaniel T. Kidder, Tomatoes	1 00
Hon. Joseph S. Fay, Collection of Potatoes	1 00
Warren Heustis & Son, Collection	2 00
Sumner Coolidge, "	2 00

JULY 27.

POTATOES.— Any variety, twelve specimens, Hon. Joseph S. Fay, Rose	3 00
Second, Hon. Joseph S. Fay, Hebron	2 00
Third, Isaac E. Coburn, "	1 00
SQUASHES.— Three Marrow, Joshua C. Stone	3 00
Second, Sumner Coolidge	2 00
PEAS.— Half-peck of any variety, C. H. Goddard, Stratagem	3 00
Second, Isaac E. Coburn, Heroine	2 00
Third, Hon. Aaron Low, Stratagem	1 00
SWEET CORN.— Twelve ears of Crosby, Sumner Coolidge	3 00
Second, Joshua C. Stone	2 00
Twelve ears of any other variety, Sumner Coolidge, Hybrid	3 00
Second, Joshua C. Stone, Hybrid	2 00
Third, Joshua C. Stone, Corey	1 00
TOMATOES.— Twelve specimens, Joshua C. Stone, Comrade	3 00
Second, Winter Brothers, President Cleveland	2 00
Third, Isaac E. Coburn, Comrade	1 00

Gratuities: —

Warren Heustis & Son, Cabbages	1 00
Sumner Coolidge, Collection	2 00
E. C. Lewis, "	2 00
W. N. Craig, "	1 00
Isaac E. Coburn, "	1 00
Walter Russell, "	1 00
Hollis Webster, " of Fungi	5 00
Joseph H. Woodford, " " "	3 00
Annie M. Livsey, " " "	2 00
William C. Bates, " " "	2 00

August 3.

Beans.— Two quarts of Goddard, shelled, Rev. Calvin Terry	3 00
Half-peck of Horticultural, Joshua C. Stone	3 00
Second, Sumner Coolidge	2 00
Third, Sumner Coolidge, King	1 00
Tomatoes.— Twelve specimens of Acme, Samuel J. Trepess	3 00
Twelve specimens of Comrade, Isaac E. Coburn	3 00
Second, Joshua C. Stone	2 00
Twelve specimens of any other variety, Isaac E. Coburn, Stone	3 00
Second, E. N. Pierce, Lorillard	2 00
Third, Isaac E. Coburn, Atlantic Prize	1 00
Egg Plant.— Four specimens of Round Purple, Joshua C. Stone	3 00
Second, Sumner Coolidge	2 00
Gratuities:—	
Joshua C. Stone, Egg Plants	1 00
Hon. John P. Spaulding, Cauliflower	1 00
C. H. Goddard, Stratagem Peas	1 00
W. N. Craig, Collection	2 00
Sumner Coolidge, "	1 00
Warren Heustis & Son, Collection	1 00

August 10.

Sweet Corn.— Twelve ears, Sumner Coolidge, Potter's Excelsior	3 00
Second, Oliver R. Robbins, Honey Dew	2 00
Third, Sumner Coolidge, Fottler's Early	1 00
Egg Plant.— Four specimens of Round Purple, Sumner Coolidge	2 00
Second, Joshua C. Stone	1 00
Gratuities:—	
Samuel J. Trepess, Tomatoes	1 00
James Comley, Cucumbers	1 00
Warren Heustis & Son, Collection	2 00
Sumner Coolidge, "	1 00
Charles E. Richardson, Fungi	2 00
William C. Bates, "	1 00

August 17.

Potatoes.— Twelve specimens of any variety, Hon. Joseph S. Fay, Hebron	3 00
Second, Samuel Hartwell, Hebron	2 00
Third, Isaac E. Coburn, Rose	1 00
Onions.— Twelve specimens, W. N. Craig	3 00
Second, Sumner Coolidge	2 00
Third, Warren Heustis & Son	1 00

GREENFLESH MELONS.— Four specimens, Isaac E. Coburn	3 00
Second, Samuel Hartwell	2 00
Third, C. L. Marshall	1 00
BEANS. — Two quarts of Large Lima, Sumner Coolidge	3 00
Second, Hon. John P. Spaulding	2 00
Two quarts of Goddard, Oliver R. Robbins	3 00
Second, Rev. Calvin Terry	2 00
Third, Samuel Hartwell	1 00
SWEET CORN.— Twelve ears of Potter's Excelsior. Mrs. Mary T. Goddard	3 00
Second, Charles B. Lancaster	2 00
Third, Hon. Aaron Low	1 00
Twelve ears of any other variety, Sumner Coolidge. Stowell's	3 00
Second, Hon. Joseph S. Fay, Stowell's	2 00
Third, Oliver R. Robbins, Honey Dew	1 00
PEPPERS.—Twelve specimens of Squash, P. G. Hanson	3 00
Second, Joshua C. Stone.	2 00
Third, E. C. Lewis	1 00
Any other variety, Nathaniel T. Kidder, Ruby King	3 00
Second, E. C. Lewis, " "	2 00
Third, Hon. Joseph S. Fay, " "	1 00
CELERY.—Four roots of any variety, Warren Heustis & Son	3 00
Second, Varnum Frost	2 00
Third, W. N. Craig	1 00

Gratuities : —

Walter Russell, Collection	3 00
W. N. Craig, "	3 00
E. C. Lewis, "	3 00
Nathaniel T. Kidder, "	2 00

AUGUST 24.

CABBAGES.—Three of any variety, trimmed, Joshua C. Stone	3 00
CAULIFLOWERS.—Four specimens, A. M. Knowlton	3 00
CELERY.—Four roots, Varnum Frost	3 00
Second, Warren Heustis & Son	2 00
BEANS.—Two quarts of Large Lima, Sumner Coolidge	3 00
Two quarts of Dwarf Lima, Hon. John P. Spaulding	3 00
Second, Isaac E. Coburn	2 00
MARTYNIAS.—Twelve specimens, Marshall W. Chadbourne	2 00
Second, Nathaniel T. Kidder	1 00
PEPPERS.—Twelve specimens of Squash, P. G. Hanson	3 00
Second, George W. Jameson	2 00
Third. Joshua C. Stone,	1 00
Any other variety, Nathaniel T. Kidder, Ruby King	3 00

Gratuities:—

Isaac E. Coburn, Collection of six varieties of Tomatoes.	3 00
Varnum Frost, Tomatoes	1 00
W. N. Craig, Collection	3 00
A. S. Coffin, Collection of Fungi	2 00
William C. Bates " "	1 00

SEPTEMBER 7.

Gratuity:—

Warren Heustis & Son, Celery	2 00

SEPTEMBER 14.

GREENFLESH MELONS.—Four specimens, E. C. Lewis	3 00
Second, Sumner Coolidge,	2 00
Third, Warren Heustis & Son,	1 00
SALMON FLESH MELONS.—Four specimens, Hon. Aaron Low	3 00
Second, Hon. Aaron Low, Christiana	2 00
Third, Hon. Aaron Low, Emerald Gem	1 00
WATERMELONS.—Two specimens, Rev. Calvin Terry	3 00
Second, Sumner Coolidge, Phinney's	2 00
Third, Sumner Coolidge, Ferry's Hybrid	1 00
CAULIFLOWERS.—Four specimens, A. M. Knowlton	3 00
Second, B. J. De Souza	2 00
Third, Joshua C. Stone	1 00
LETTUCE.—Four heads of any variety, E. C. Lewis, Defiance	3 00
Second, Sumner Coolidge	2 00
Third, E. C. Lewis, Sutton's Favorite	1 00
CELERY.—Four roots of any variety, Arthur F. Coolidge	3 00
Second, Warren Heustis & Son	2 00
PARSLEY.—Two quarts, Sumner Coolidge	2 00
Second, Mrs. Mary T. Goddard	1 00
BEANS.—Two quarts of Large Lima, Varnum Frost	3 00
Second, Sumner Coolidge	2 00
Third, Mrs. Mary T. Goddard	1 00
CORN, SWEET.—Twelve ears of Potter's Excelsior, Charles B. Lancaster	3 00
Second, Sumner Coolidge,	2 00
Third, P. G. Hanson	1 00
Any other sweet variety, Oliver R. Robbins, Hickock	3 00
Second, P. G. Hanson, Quincy Market	2 00
Third, Arthur F. Coolidge, Stowell's	1 00
EGG PLANT.—Four Round Purple, Sumner Coolidge	3 00
Second, Arthur F. Coolidge,	2 00
Third, Joshua C. Stone	1 00
TOMATOES.—Three varieties, twelve specimens each, Varnum Frost,	5 00
Second, Hon. Aaron Low	4 00
Third, W. N. Craig	3 00

Twelve Acme, Hon. Aaron Low	3 00
Second, Samuel J. Trepess	2 00
Third, Mrs. Mary T. Goddard	1 00
Twelve Comrade, Varnum Frost	3 00
Second, Isaac E. Coburn	2 00
Third, Hon. Aaron Low	1 00
Twelve Ignotum, Isaac E. Coburn	3 00
Second, Mrs. Mary T. Goddard	2 00
Twelve May's Favorite, Varnum Frost	3 00
Second, Nathaniel T. Kidder	2 00
Third, Hon. Aaron Low	1 00
Twelve Paragon, Varnum Frost	3 00
Second, P. G. Hanson	2 00
Third, Samuel J. Trepess	1 00
Twelve of any other variety, Varnum Frost, Stone	3 00
Second, Isaac E. Coburn, Stone	2 00
Third, P. G. Hanson, Stone	1 00
MARTYNIAS.—Twelve specimens, Marshall W. Chadbourne	2 00
Second, Nathaniel T. Kidder	1 00
OKRA.—Twelve specimens, Nathaniel T. Kidder	3 00
Second, Nathaniel T. Kidder, Dwarf	2 00
Third, Warren Heustis & Son	1 00
PEPPERS.—Twelve specimens of Squash, P. G. Hanson	3 00
Second, George W. Jameson	2 00
Third, Joshua C. Stone	1 00
Any other variety, Nathaniel T. Kidder, Bull Nose	3 00
Second, Hon. Aaron Low, " "	2 00
Third, Nathaniel T. Kidder, Ruby King	1 00

Gratuities:

Hon. Aaron Low, Collection of ten varieties of Tomatoes	3 00
C. E. Lewis, Collection	5 00
W. N. Craig, "	3 00
Walter Russell, "	1 00
P. G. Hanson, "	1 00

SEPTEMBER 21.

Gratuities:—

Warren Heustis & Son, Celery	2 00
Ettore Tassinari, Onions	1 00
Daniel T. Curtis, Cucumbers	1 00

ANNUAL EXHIBITION OF FRUITS AND VEGETABLES.

October 2 and 3.

Special Prizes.

Cauliflowers.— Best four specimens, and best kept during the exhibition, William H. Teele	5 00
Second, A. M. Knowlton	4 00
Celery.— Best four specimens, and kept best during the exhibition, Warren Heustis & Son	8 00
Second, Arthur F. Coolidge	6 00

Regular Prizes.

Beets.— Twelve Turnip Rooted, Varnum Frost.	3 00
Second, Warren Heustis & Son	2 00
Third, H. R. Kinney	1 00
Carrots.— Twelve Long Orange, H. R. Kinney	3 00
Twelve Intermediate, H. R. Kinney	3 00
Second, Henry E. Rich	2 00
Third, Warren Heustis & Son	1 00
Parsnips.— Twelve Long, H. R. Kinney	3 00
Second, E. C. Lewis	2 00
Third, Mrs. J. W. Clark	1 00
Potatoes.— Four varieties, twelve specimens each, C. H. Thomas	5 00
Second, Mrs. Mary T. Goddard	4 00
Third, Isaac E. Coburn	3 00
Clark, Twelve specimens, Samuel Hartwell	3 00
Second, Mrs. Mary T. Goddard	2 00
Third, Isaac E. Coburn	1 00
Hebron, Isaac E. Coburn	3 00
Second, W. F. Wilder	2 00
Third, H. R. Kinney	1 00
Rose, Isaac E. Coburn	3 00
Second, B. J. De Souza	2 00
Third, Mrs. Mary T. Goddard	1 00
Savoy, Samuel Hartwell	3 00
Second, Hon. Aaron Low	2 00
Third, H. R. Kinney	1 00
Any other variety, C. H. Thomas, Rural New Yorker	3 00
Second, W. F. Wilder, Monroe County Prize	2 00
Third, H. R. Kinney, Potentate	1 00
Salsify.— Twelve specimens, Nathaniel T. Kidder	3 00
Second, E. C. Lewis	2 00
Third, Samuel J. Trepess	1 00

TURNIPS.— Twelve Flat, F. J. Kinney	2 00
Second, Henry E. Rich	1 00
Swedish, B. J. De Souza	2 00
Second, H. R. Kinney	1 00
ONIONS.— Twelve Danvers, Ettore Tassinari	3 00
Second, William O'Connell	2 00
Third, Varnum Frost	1 00
Red, William O'Connell	3 00
Second, W. N. Craig	2 00
Third, Nathaniel T. Kidder	1 00
White, William O'Connell	3 00
Second, Walter Russell	2 00
SQUASHES.— Three Bay State, Sumner Coolidge	3 00
Second, Hon. Aaron Low	2 00
Third, Charles B. Lancaster	1 00
Hubbard, Arthur F. Coolidge	3 00
Second, Sumner Coolidge	2 00
Third, E. C. Lewis	1 00
Hybrid Turban, Hon. Aaron Low	3 00
Second, Joshua C. Stone	2 00
Third, E. C. Lewis	1 00
Marblehead, E. C. Lewis	3 00
Marrow, Sumner Coolidge	3 00
Second, Varnum Frost	2 00
Third, Arthur F. Coolidge	1 00
BRUSSELS SPROUTS.— Half-peck, E. C. Lewis	3 00
Second, Richard T. Lombard	2 00
Third, W. N. Craig	1 00
CABBAGES.— Three Drumhead, trimmed, Charles B. Lancaster	3 00
Second, Mrs. Mary T. Goddard	2 00
Third, Samuel Hartwell	1 00
Red, trimmed, Mrs. George S. Harwood	3 00
Second, H. R. Kinney	2 00
Third, Charles B. Lancaster	1 00
Savoy, trimmed, Joshua C. Stone	3 00
Second, Samuel J. Trepess	2 00
Third, Samuel Hartwell	1 00
CAULIFLOWERS.— Four specimens, William H. Teele	3 00
Second, A. M. Knowlton	2 00
Third, B. J. De Souza	1 00
CELERY.— Paris Golden, four roots, best kept, Arthur F. Coolidge	4 00
Second, Warren Heustis & Son	3 00
Third, Varnum Frost	2 00
Any other variety, H. R. Kinney, Giant Pascal	4 00
Second, Warren Heustis & Son, " "	3 00
Third, Mrs. J. W. Clark, Pomfret, Conn., White Plume	2 00

ENDIVE.— Four specimens, H. R. Kinney	3 00
Second, Sumner Coolidge	2 00
Third, Mrs. Mary Haller	1 00
LETTUCE.— Four heads, Sumner Coolidge	3 00
Second, Warren Heustis & Son	2 00
Third, Joshua C. Stone	1 00
PARSLEY.— Two quarts, Mrs. Mary T. Goddard	3 00
Second, Arthur F. Coolidge	2 00
Third, Sumner Coolidge	1 00
HORSERADISH.— Six Roots, H. R. Kinney	3 00
CORN.— Yellow, or Field, twenty-five ears, traced, William H. Cowen	3 00
Second, William H. Cowen, eight rowed	2 00
Third, Thomas H. Perkins	1 00
EGG PLANT.— Four Round Purple, Arthur F. Coolidge	3 00
Second, Sumner Coolidge	2 00
Third, Mrs. J. W. Clark	1 00
TOMATOES.— Three varieties, twelve specimens each, Varnum Frost	5 00
Second, Hon. Aaron Low	4 00
Third, " " "	3 00
Acme, twelve specimens, Hon. Aaron Low	3 00
Second, Samuel J Trepess	2 00
Third, Henry E. Rich	1 00
Comrade, P. G. Hanson	3 00
Second, Varnum Frost	2 00
Third, Hon. Aaron Low	1 00
May's Favorite, Hon. Aaron Low	3 00
Second, W. N. Craig	2 00
Third, Varnum Frost	1 00
Paragon, P. G. Hanson	3 00
Second, Hon. Aaron Low	2 00
Third, Oliver R. Robbins	1 00
Any other variety, Samuel J. Trepess, Ignotum	3 00
Second, Isaac E. Coburn, Stone	2 00
Third, P. G. Hanson, President Cleveland	1 00
PEPPERS.— Twelve specimens of Squash, P. G. Hanson	3 00
Second, George W. Jameson	2 00
Third, Joshua C. Stone	1 00
Any other variety, George W. Jameson, Ruby King	3 00
Second, Nathaniel T. Kidder, Bull Nose	2 00
Third, Mrs. J. W. Clark, " "	1 00

Gratuities : —

Hon. Aaron Low, Thirteen varieties of Potatoes	3 00
E. C. Lewis, Watermelons	1 00
Samuel Hartwell, Melons	1 00
Henry E. Rich, Beans	1 00

Samuel Hartwell, Lima Beans		1 00
Warren Heustis & Son, Collection of Celery		3 00
Hon. Aaron Low,	" " Tomatoes	3 00
Isaac E. Coburn,	" " "	2 00
Nathaniel T. Kidder,	" " Sixty Varieties	10 00
H. R. Kinney,	"	4 00
W. N. Craig,	"	3 00
E. C. Lewis,	"	3 00
Varnum Frost,	"	3 00
Walter Russell,	"	3 00
Warren Heustis & Son,	"	2 00
Ettore Tassinari,	"	1 00

OCTOBER 12.

Gratuities : —

Warren Heustis & Son, Celery	1 00
Patrick Melia, Squash	1 00

OCTOBER 19.

Gratuities : —

Warren Heustis & Son, Celery	1 00
Ellen N. Rumrill, Native Mushrooms	1 00

NOVEMBER 5.

Gratuity : —

George M. Anderson, Mushrooms	1 00

EXHIBITION OF WINTER FRUITS AND VEGETABLES.

NOVEMBER 16.

CUCUMBERS.— Francis Blake, White Spine	3 00
Second, H. R. Kinney, " "	2 00
Third, John L. Gardner, Telegraph	1 00
CABBAGES.— Three Red, trimmed, Charles B. Lancaster	3 00
Second, Mrs. Mary T. Goddard	2 00
Three Savoy, George Sanderson	3 00
Second, Joshua C. Stone	2 00
BRUSSELS SPROUTS.— Half-peck, Nathaniel T. Kidder	3 00
Second, W. N. Craig	2 00
CAULIFLOWERS.—Four specimens, A. M. Knowlton	3 00
Second, William H. Teele	2 00
Third, B. J. De Souza	1 00
CELERY.— Four roots, Warren Heustis & Son, Paris Golden	3 00
Second, H. R. Kinney, Paris Golden	2 00
Third, Warren Heustis & Son, Giant Pascal	1 00

LETTUCE.— Four heads, Arthur F. Coolidge	3 00
Second, Joshua C. Stone	2 00
Third, Nathaniel T. Kidder	1 00
TOMATOES.— Twelve specimens, William C. Winter, Chemin	3 00
Second, William C. Winter, Early Essex	2 00
Third, " " " President Cleveland	1 00

Gratuity: —

Francis Blake, Collection	2 00

FIRST CLASS CERTIFICATE OF MERIT.

November 30. A. W. Crockford, for superior cultivation of Mushrooms.

REPORT

OF THE

COMMITTEE ON GARDENS,

FOR THE YEAR 1895.

By JOHN G. BARKER, Chairman.

The season of 1895 has not differed in many respects from those that have preceded. For the H. H. Hunnewell Triennial Premium no application has been made, but we are glad to report that we already have an application for 1896, and another one is confidently expected. For the best arranged and best kept Flower Garden, named Hardy Perennial and Biennial Plants admissible, although we should naturally think that this prize would draw attention from those who have flower gardens, in many years not more than one application has been received. No application was received for the Rose House. Some changes have been made in the Schedule, which we trust may attract the attention of the various growers.

We find it impossible to arrange a Schedule that will include all that we should like to offer prizes for. But this fact need not deter anyone from calling the attention of the Committee to any object he may have worthy of inspection.

During the season of 1895 we have made nine visits, and we trust that the account presented of each one will be sufficient evidence to the Society of the continued usefulness of the Garden Committee.

Mr. S. C. Pratt's Strawberry Garden, Reading.

Mr. Pratt having made his entry for the best Fruit Garden, the Committee made their visit on the 18th of June. We found that he devoted about fifteen acres to the cultivation of Strawberries, and we were informed that his business is more for the sale of plants than fruit. A complete system of irrigation is in use, which of course is indispensable. About one ton of fertilizer is used to each acre, the chemicals being obtained from a reliable source, Mr. Pratt doing his own mixing, using 1,500 pounds of dissolved Bone Black and 500 pounds of high-grade Sulphate of Potash, costing about $22. A bed is fruited but one season, and first-class fruit is obtained. Mr. Pratt says that his experience with fruiting an old bed has not been satisfactory; the berries are second class and give the grower a poor reputation.

The first fruit picked for the market was June 15, from Beder Wood; the last picking was on the 10th of July, from Beverly, Timbrell, and Fountain. Two acres were fruited that were grown in the narrow row system, for fruit only, Beverly and Barton's Eclipse yielding 20,000 baskets of first-class fruit. Mr. Pratt says: "I am satisfied that with such a yield it pays to raise the fruit at six cents a quart," and that he received twice that at wholesale.

J. W. Manning's Herbaceous Garden, Reading.

On the same day the Committee enjoyed a very profitable visit at the grounds of Mr. Manning, especially in looking over the collection of Herbaceous Plants and some new shrubs of merit. Those who are attendants at the weekly exhibitions have admired and profited by the exhibits of Mr. Manning, and we desire to record our satisfaction at the care bestowed upon his plants, not only in cultivation but in keeping them true to name. No garden is complete today without the hardy bed, for there is nothing that the landscape gardener can use that will give greater satisfaction.

Mr. Manning writes us as follows:

Reading, Mass., Jan. 21, 1896.

Mr. John G. Barker, Chairman of Committee on Gardens:

Dear Sir:— Agreeably to your request I take pleasure in giving you some notes upon the Hardy Perennials and other plants that your Committee viewed at the Reading Nursery last September.

At Reading we labor under considerable difficulty in the matter of soil, which is quite generally a very light loam, devoid of any traces of clay, but with an excessive preponderance of gravel at times; consequently in many cases we find it quite out of the question to attempt the raising of certain classes of nursery stock which are better grown on a clay soil. For this reason large blocks of Pears, Plums, and Cherries are not to be seen with us. On the other hand for the raising of many sorts of Hardy Herbaceous plants and most of the Shrubs, our soil is exceptionally well adapted.

Among new Hardy Shrubs we find the following of the greatest promise and worthy of extended culture:

Stephanandra flexuosa, of Japanese origin, forms a densely branched shrub with deeply toothed foliage, of a rich glossy green, taking on unusual tints of reddish purple in its young growth and again at its autumn ripening. The branches are long and slender, densely clothed with branchlets, and the white flowers, though minute, are borne in such profusion as to give considerable effect. A plant that clothes itself well to the ground even with age,— a feature of itself.

Rubus deliciosus, the Rocky Mountain Bramble, is very hardy with us and of neat habit of growth, with foliage of a pleasing light green, and a wealth of rich white flowers in June and July; each an inch and a half across, giving the effect of single roses.

Caryopteris Mastacanthus, the so-called Blue Spiraea, is proving of great interest, with its dense whorls of rich deep blue flowers in late September, continuing till frost. Much after the habit of the Desmodium, this probably will kill back nearly if not quite to the ground yearly, but will not kill out completely unless present indications and reports are decidedly wrong. We are indebted to China for this acquisition.

Hypericum Moserianum, with its rich foliage and elegant large golden flowers in great profusion, is of highest merit but the matter of a good winter covering of leaves must not be overlooked.

Double Lilacs and the new single forms, of which there is such a confusing variety, at present show remarkable improvements, and cannot fail to add greatly to our early summer shrubbery effects. I note among the best the following:

Philemon.— Rich wine red; perhaps the deepest colored of all the single or double sorts.

Comte Horace de Choiseul.— Double, deep reddish purple.

Chinensis alba.— A dwarf form, with pure white starry flowers with distinct lilac eye.

Trainoniana.— Rich blue; very prolific.

Louis Spaeth.— Deepest reddish purple.

Spiraea arguta.— A new Japanese species, among the earliest and best of new Spiraeas.

Daphne Genkwa.— A deciduous species from Japan, with dense clusters of small intensely fragrant, lilac flowers. It can be highly recommended.

Berberis ilicifolia, the Holly-leaved Barberry is a stronger grower than the Mahonia; not quite so evergreen but with a rich purple shading of foliage in the younger growth and a deep clear green with age. Seemingly quite hardy, this gives great promise.

Colutea purpurea is a notable improvement in flower over the old form of the Bladder Senna; more prolific and richly colored.

Viburnum tomentosum cannot be too highly recommended as a large growing shrub. Its great profusion of showy flat cymes of pure white flowers are well set off by its rich foliage.

Among the newer variegated foliaged shrubs, *Cornus alba* var. *Spaeth*, with rich shading of green and gold; the Golden Hop Tree *(Ptelea trifoliata* var. *aurea);* the Variegated Syringa or Mock Orange, with handsome marbling of silver and green; and the Variegated *Hypericum Moserianum*, with shades of green, gold, and flesh color, are all notably good additions.

In trees the most remarkable good new things that we have tested are the Van Houtte's Golden Elm, with beautiful golden foliage having a charming metallic luster in the full sun, and Dampier's Golden Elm, nearly if not quite as good,— both varieties of the English Elm; the Weeping Purple Beech, a grand thing with good weeping tendencies and a particularly rich purple coloring of foliage; the Tricolor Beech, having the foliage handsomely variegated with shades of purple and red; Teas's Weeping Mulberry, and Bunge's Catalpa; this last forming a dense globe of large and showy foliage, and on specimens grafted on a good standard stem forming a particularly desirable tree for lawn use.

Our collection of Hardy Herbaceous Perennials, of which we feel that we have a very fair one, embracing as it does something over two thousand varieties at the present time, with a discardure after careful testing during the last ten years of perhaps one-half

as many more, has given us food for much thought as to their possibilities in the near future. We are well aware that our soil, with its light nature admits the cultivation of many sorts that in a more retentive soil would probably prove less hardy, but leaving aside the possibly tender sorts it is a pleasure to note the following newer kinds as perfectly hardy with us under the severest trials that we can give them, and consequently such as we would recommend for further trial in other soils:

Achillea Eupatorium, the Noble Yarrow, with a constant succession of broad flat heads of clear lemon yellow.

Aconitum autumnale, the latest blooming of all Monkshoods.

A. Napellus var. *bicolor*, with tall spikes of blue and white.

Æthionema grandiflora, a charming evergreen, with dense heads of rich pale purple.

Ajuga Genevensis, of dense growth, completely enveloped in showy clusters of the richest blue in early summer.

Alstrœmeria aurantiaca has clusters of showy, lily-like, yellow flowers, handsomely streaked with purple.

Anemone sylvestris has pure white flowers in early summer.

Aquilegia vulgaris var. *alba* (Munstead White), with purest white flowers, is one of the most satisfactory of the Columbines, without the objectionable dying-out habit of this class.

Arabis albida var. *variegata*.—Foliage beautifully variegated with gold and green.

Armeria maritima var. *Lauchiana*, a beautiful form of the Thrift, with dark green foliage, dense tufted habit, and a nearly constant succession of rich deep crimson flowers. An elegant edging plant, which might well supersede the dwarf box.

Arnebia echioides, the Prophet flower, with dense clusters of rich yellow flowers, curiously spotted with fading purple.

Asperula odorata, the Maitrank of the German nation, forming a dense carpet of green with intensely fragrant clusters of minute pure white flowers.

Of Hardy Bamboos, the following seem to be quite reliable: *Bambusa falcata*, *B. Metake*, *B. Ragamowski*, *B. Simonii*, *B. striata* and *B. viminalis*, all particularly graceful in their leaf effects.

Callirhoe involucrata, the Poppy Mallow, is nearly always in bloom and its rich crimson flowers are particularly showy on the vines in early morning.

Campanula Van Houtteii can never be omitted from a list of really good things. Its flowering effect is simply marvellous in well established clumps.

Centaurea montana and its different varieties, particularly the pure white form, are choice for cutting and are continuous bloomers.

Delphinium Chinensis.—These are too little known and should be extolled to the utmost, producing as they do an almost constant succession of loose open panicles of beautiful flowers in the most exquisite shades of blue, lavender, and white, in many cases oddly spotted with deeper shades. For cutting purposes these should never be omitted from the flower garden.

Desmodium penduliflorum, classed either as herbaceous or a shrub, is especially desirable for its wealth of bloom just in advance of frosty weather.

Doronicum plantagineum var. *excelsum* is among the finest of spring flowers, with a wealth of rich golden yellow aster-like flowers.

Elymus glaucus is a particularly showy grass, with rich silvery foliage, and soon forms a fine clump.

The Epimediums are among my choicest favorites, with their elegant showy foliage, so odd in shape and so handsomely colored in its young growth, and the showy panicles of flowers are noteworthy among spring-blooming perennials; *E. alpinum*, with red and white starry flowers; *E. sulphureum*, pure yellow; *E. niveum*, pure white; and *E. macranthum*, with pale mauve purple Orchid-like flowers, are among the choicest of this genus.

Eulalia gracillima is a particularly showy grass with long, slender, white-ribbed leaves, the whole plant producing a vase like effect.

Glaucium Fischeri has particularly showy silvery foliage and a good supply of orange colored flowers.

Globularia tricosantha, with its tufted habit and dense heads of blue, is desirable for any well drained spot.

Gypsophila repens forms a densely branched carpet of foliage, handsomely set with clusters of small white flowers tinged with pink.

G. Steveni is an improvement over the old Chalk Plant in its dwarfer habit and more continuous blooming, and is earlier as well.

Helenium Hoopesii is the choicest of the Sneezeworts, forming immense candelabra like heads of rich golden yellow flowers.

Of the Helianthemums much could be said; all are evergreen, forming dense carpets of foliage, and in midsummer thickly studded with yellow flowers like minute roses in the species *angustifolia*, *croceum*, and *vulgare*, while *H. hyssopifolium* gives us copper colored and *H. rhodanthemum* bright red flowers.

In the Sunflowers, *Helianthus mollis* has glaucous, velvety foliage and handsomely formed lemon yellow flowers; *H. lætiflorus*, with rich orange semi-double flowers on long clean wiry stems, is particularly to be recommended for cutting purposes.

Hemerocallis Thunbergii is a welcome addition to the Yellow Day-lilies, coming into bloom in July and bearing rich lemon yellow flowers, of a mild but charming fragrance.

H. aurantiaca major is being tested and we have much hope from it.

H. Dumortierii and *H. Middendorfiana* are two orange yellow species of recent introduction and both can be recommended.

Heuchera sanguinea is perfectly hardy, and would be desirable for its handsomely mottled foliage alone, while the addition of its rich scarlet vermilion flowers, in dense long stemmed clusters, renders it quite unique among the good new things.

Lupinus polyphyllus in its clear blue, pure white, and variegated blue and white forms, is a first-class border plant.

Omphalodes verna and its pure white form, both known as Creeping Forget-me-nots, thrive admirably with us and form dense carpets of broad foliage with clusters of blue and white or white flowers.

Papaver pilosum, a species of Poppy from Bothnia, with salmon colored flowers, is in almost constant bloom.

Polemonium humile or *Richardsonii* is among the best of the Jacob's Ladders, having clusters of large pure blue flowers with a most charming odor.

The hybrid Potentillas or Cinquefoils are perfectly hardy, increase rapidly and give a wealth of bloom in midsummer. The coloring of the semi-double forms is remarkably rich in shades of yellow, orange, purple, and crimson. In their season these are among the choicest of garden plants.

In Primulas I have found a source of delight and surprise. *P. denticulata*, *P. vulgaris* in all its forms, *P. officinalis*, *P. cortu-*

soides, *P. Sieboldii*, and *P. Japonica* do well, and some other sorts can with little care be safely wintered. Those noted thrive without any covering being necessary, and I have been surprised that the old-fashioned Polyanthus has not been more freely planted than it is. Nothing is more charming than a good edging of primulas, and in the open border, when planted singly or in clusters, they always command attention to the exclusion of other flowers in spite of the great wealth of bloom that we have in spring. The forms of *Primula Sieboldii* are all welcome additions and as soon as well known will be extensively planted.

There continues a great improvement in the Hybrid Pyrethrums and many deep shades of yellow and copper are appearing among the newer double sorts. In light soils we find these perennials first class in every way.

Scabiosa Caucasica is one of the most desirable plants in the entire collection, producing a profusion of large showy lavender flowers, each on a good stem for cutting. There is a shade of color in this flower quite beyond description, which is particularly beautiful. For cutting purposes this is invaluable.

Silene Virginica, the Fire Pink, I have no difficulty in growing, and this can be particularly noted as one of the most brilliant flowers that we have; a dazzling cardinal.

In Spiraeas the *palmata* section is coming rapidly to the front as well they may, their sturdy habit of growth and showy spikes of rich red rendering them among the best of their class.

Solidago rigida is the most satisfactory of the Golden-rods, producing heavy trusses of rich golden yellow flowers. This is less weedy than most sorts and altogether is very satisfactory.

The Silver Thyme is quite hardy with us and forms a neat carpet plant, with particularly showy silver and green variegated foliage.

Tricyrtis hirta, the Toad Lily, is among the most curious plants we have, giving a remarkable amount of bloom just in advance of hard frost in most grotesquely formed and colored flowers.

Among the Veronicas or Speedwells I must not fail to mention the following as quite indispensable: *V. amethystina*, a dense bushy plant with innumerable clusters of deepest amethyst blue; *V. longifolia* var. *subsessilis*, with long spikes of richest blue in late summer and continuing nearly to frost; *V. rupestris*, forming

a dense low carpet of evergreen verdure quite hidden in spring with its clouds of bright blue flowers; *V. incana* with its silvery foliage, setting off so well its upright spikes of lavender purple, and *V. pectinata*, with grayish woolly foliage and deep blue spikes.

The above represent to a certain extent the less well-known sorts of hardy perennials; the list is only partially complete, yet possibly is as long as should be given to occupy the room of the report.

JACOB W. MANNING.

MRS. J. W. CLARK'S ESTATE, POMFRET, CONN.

On the 20th of August the Committee visited this estate, the special object being to inspect the vinery, from which for several seasons very fine fruit has been shown at the exhibitions by Mrs. Clark. The account given by Mr. John Ash, the successful gardener, will be read with interest and profit. The vinery gave evidence in every way of skillful cultivation, showing at this time some very fine fruit. Other objects of special interest might be mentioned, but at some future time a more extended report of the grounds will probably be given. It may, however, not be out of place to say now that the entire grounds were in excellent condition, having all the requirements of a first class private place. The vegetable garden was especially noticeable, its arrangement being very orderly, and with a large succession of all the standard varieties of vegetables in great abundance. The farm was quite a feature, with a large barn for storing hay and keeping the horses and cattle, all in excellent condition, and giving evidence of good management and reflecting much credit on Mr. Ash who has the direction of the entire estate.

Mr. Ash's account of his method of cultivation is as follows:

I would say, with regard to my mode of cultivating grapes that it is very simple. I start my grapery about Febuary 15th, at a temperature of from 43° to 48° of artificial heat, allowing the sun heat to run it up to from 80° to 85° with moderate ventilation, keeping the house at these temperatures until the buds show signs of swelling, when I raise the artificial heat to 55°, night temperature, with a day temperature of 60°. I keep the house at this heat until the vines have made a growth of about three inches, when

I again raise the temperature to from 60° to 65°, night, and from 65° to 70°, day. When starting my house I give the border a thorough soaking with water heated to 85°, repeating the operation once about two weeks before the vines are in bloom, at which time I keep the atmosphere in the house moderately dry, ventilating freely on bright days and only damping the floor about midday. This treatment is followed until the fruit is set, when I put on a top-dressing of barnyard manure and give the border a thorough watering with tepid water, repeating as often as is required. Just when the grapes commence to take their second swell, I give a copious watering with liquid manure and another similar dose just before the grapes begin coloring. After this I use only clear water, and when the grapes are ripe I keep the border as dry as possible without allowing the vines to suffer. My grapery is 50×20 ft.

The extent of this estate is one hundred acres; we have about six acres of lawn and flower garden, and about four acres of vegetable garden. We grow almost everything in the vegetable line. Besides the grapery we have a Palm house 50×20; Rose house 50×18; one house for general greenhouse flowering plants, 50×18, and a house for Carnations and Violets 100×10. The greenhouses are heated by hot water (overhead system), using two Foster boilers connected so that we can use either separately or in conjunction with each other.

W. D. Hinds's Peach Orchard.

For the best Fruit Garden an application was received from Mr. W. D. Hinds of Townsend to examine his orchard of Crosby Peaches. Not since 1881 have your Committee had an opportunity to inspect a Peach orchard; at that time we visited those of John B. Moore and Marshall Miles of Concord, and Thomas C. Thurlow of West Newbury. Those who were there remember what success these cultivators had achieved. Since then we began to think that the days of Peach cultivation in Massachusetts had ended, but this visit to Mr. Hinds quickly dispelled all such thoughts. We have endeavored to obtain all the good points we could on peach culture, and we venture a few extracts in regard to the subject. The revised edition of A. J. Downing's "Fruits and Fruit Trees of America," 1869, says, "Thousands of acres are devoted to this crop for the supply of the markets of our

large cities. . . . Many growers have orchards of from 10,000 to 100,000 trees of different ages, and send to market in good seasons as many bushels of fruit from the bearing trees."

The following extract is as important now as it was when written twenty-seven years ago.

"The very great facility with which the peach grows in this country, and the numerous crops it produces, almost without care, have led to a carelessness of cultivation which has greatly enfeebled the stock, and, as we shall presently show, has in many places produced a disease peculiar to this country. This renders it necessary to give some additional care and attention to the cultivation of the peach; and with very trifling care this delicious fruit may be produced in great abundance for many successive years." "Garden and Forest," 1894, p. 467, says, "Some nine thousand acres of land in Western New York are devoted to the peach industry. . . . Professor Bailey thinks that the peach industry, more than any other pomological interest, suffers peculiarly from careless methods. The first error is lack of cultivation; the second, inattention to borers and yellows; the third is neglect to thin the fruit, and the fourth is carelessness in marketing." Then follow excellent suggestions on Locations and Soils, Cultivating and Fertilizing, and Pruning and Thinning Fruit. On this last point we copy the remarks, which are practical and very useful.—"No two peaches should be allowed to develop nearer than five inches apart. No work of the orchard pays better than thinning the fruit, either in the price which the remaining produce brings or in the energy which is saved to the tree. When regularly thinned the tree bears every year unless injured by frost. The fruit must be picked sooner or later, and the work is more easily done in June than in September, so that no labor is lost. The thinning should be delayed until the fruit is the size of the end of a man's thumb, and by this time the 'June drop' has occurred, and the fruit can readily be seen." The points suggested in regard to marketing are so well known to all cultivators that it is unnecessary to reproduce them; suffice it to say that too much care cannot be exercised in handling and properly packing; crushed and bruised fruit is not attractive to the purchaser.

Now as to the Crosby Peach, that most conservative and careful of all careful periodicals, which is always slow in indorsing a new thing, "Meehan's Monthly" for 1894, p. 77, says, "The Crosby Peach seems to be a kind that has come to stay awhile and is well suited to New England gardens. It originated near Lowell, Mass., in 1875. It is one of the sweetest of the yellow Crawford class, and a particularly abundant and regular bearer."

We give the following statements by Mr. W. D. Hinds and Mr. A. J. Hinds in the belief that they will be found of much interest.

Statement of Mr. W. D. Hinds.

Townsend, Mass., Nov. 9, 1895.

Mr. John G. Barker:

Dear Sir:—In reply to yours of the 5th instant I will say that after seeing the Crosby Peach fruit four years in succession previous to 1888, and two years when we had no peaches of any other variety, I decided to set out an orchard as soon as I could get the trees. As the originator had died and no one else was propagating this variety I set two hundred Fox Seedling trees in the spring of 1888 and rebudded them in August with the Crosby. This being my first attempt at budding I only got about a hundred of them to grow. In the fall of 1888 I sent some buds to Hale Brothers to bud some trees for me. From these I got one hundred and fifty trees, which I set in the spring of 1890. I had also grown from three hundred to four hundred trees, which I budded myself; some of them I set out and some of them I sold. In the spring of 1891, I received about two thousand trees from Hale Brothers, selling eight hundred of this lot to my brother and some to my father and setting some of the small ones myself. I have set two or three hundred every spring since, so that I have now about two thousand trees in my orchard. About six hundred trees were in bearing this season, from which I sold over twelve hundred baskets of very fine fruit, for from one dollar to two dollars per basket.

Had it not been for the severe frosts in May, while the trees were in blossom, I should have had at least five hundred baskets more, as I had over six hundred three year old trees on which the frosts killed all the blossoms; they were as full as possible up to

that time. My orchards have been fertilized with bone tankage and muriate of potash, using the tankage in the fall and the potash in the spring. Last spring I used about eight hundred pounds of sulphate of potash per acre. Of tankage I used from one to two tons per acre according to the age of the trees.

The trees have all made a satisfactory growth and bid fair now to give us more fruit next year.

We are just spreading on the tankage again, my brother and I using nearly thirty tons this fall. We intend to do our part to the best of our knowledge and if the chief of the weather bureau prescribes the right kind of a winter we hope to be able to invite the Committee again to see some more Peaches.

Very truly yours,

W. D. Hinds,

Excelsior Fruit Farm, Townsend, Mass.

Statement of Mr. A. J. Hinds.

John G. Barker, Esq.:

Dear Sir:—In compliance with your request I herewith give a brief synopsis of my experience in the Peach industry in Townsend, Mass.

I set my first two hundred and fifty trees in the spring of 1888, eight hundred in the spring of 1891, and a few each spring since, having now about two thousand two hundred trees. In 1893 I had from the first two hundred and fifty trees about two hundred and fifty baskets of fruit. I had about one thousand trees in bearing this year, from which I took two thousand five hundred baskets of fruit, and sold it at very fair prices.

From the start I have held to the clean culture method from early spring until about the 15th of August, and until the third year have usually sown winter rye at the last cultivation, ploughing it in in the spring. I have also used considerable quantities of meadow hay for mulching every season. For fertilizers I have used scrap and bone (tankage) and both muriate and sulphate of potash and wood ashes. I have used the above in varying quantities according to the present conditions of the trees and the previous condition of the land, but sufficient to produce a vigorous growth, necessitating thorough pruning twice each season to keep

the trees in shape. The growth and general appearance of the trees under the above treatment has been satisfactory.

Were I asked to name the *essentials* for the successful culture of Peaches I should say:

First. Proper selection of location and soil, which should be high and well drained.

Second. Proper setting out of the trees, which should not be too deep in the ground. Many trees make a bad start and are apt to have the yellows because set too deep.

Third. Constant and thorough cultivation throughout the growing season and watchfulness for borers and other insects.

Fourth. Close and energetic attention to pruning and thinning of the fruit. One-half of the crop should be picked by the time it gets the size of marbles.

And lastly as in most other lines of business, personal supervision and attention to details, which if I were to enumerate would make the reader tired, as well as the man whose lot it is to attend to those things closely enough to win success in the cultivation of peaches.

A. J. Hinds.

Townsend, Nov. 15, 1895.

Forest Hills Cemetery, Jamaica Plain.

Before calling your attention to the visit at this place, it may be well to remind you that in previous years, visits to cemeteries formed no small part of the duties of the Garden Committee. As early as 1857, 1858, 1859, and 1860, the Transactions record visits at Woodlawn Cemetery, Chelsea, and in 1858 and 1860 to Mount Auburn, Cambridge. I cannot find that any other visit was made there. In 1866 Mount Hope, West Roxbury, was visited; it was then under the charge of the late C. M. Atkinson, who was awarded a gratuity for skill and care in its management. In 1867, Oak Hill Cemetery, Newburyport, was visited. In 1868, Mount Hope was again visited, and a gratuity was awarded for successful efforts in improving the cemetery. In 1872, Newton Cemetery was visited, and a gratuity was awarded to the Superintendent, Henry Ross, who had done much to be commended in the work of Landscape Gardening. In 1875, Woodlawn was again visited and also Newton Cemetery. In 1877, Newton Cemetery was again visited, and a gratuity was awarded for correct taste displayed

in planting flower beds, and beautifying the grounds. In 1879 a visit was made to Pine Grove, Lynn; in 1884 again to Newton and Pine Grove, and in 1889 again to Newton, when an award was made for well kept grounds, and artistic laying out and improvement of the same. The next visit was to Forest Hills, in Roxbury, 1895. Since the Horticultural Society was the promoter of Mount Auburn Cemetery, which is known all over this continent and in foreign lands, and whose influence has done so much to improve our Rural Cemeteries, it seems eminently fitting that the connection between the Society and the cemeteries should be maintained.

The Garden Committee having expressed a wish that they might have an opportunity to visit Forest Hills, your Chairman, being the Superintendent felt that it might look like sounding his own praises, and confessed to some diffidence in extending the invitation, but upon consultation with the President of the corporation, it was decided to invite the Committee with the Trustees and other friends. On the 26th of September the invitation was accepted, and while a goodly number were present we regret that all who were invited could not be with us. About two hours were spent in driving through the grounds giving a general idea of the place.

Forest Hills was consecrated June 28, 1848, and was controlled by the City of Roxbury until the year 1868, when Roxbury was annexed to Boston, and by a special act of the Legislature it was then conveyed to the lot holders and since that time has been under the control of a board of seven Trustees, one being elected each year at the annual meeting of the proprietors. This Board of Trustees has full control of the affairs and property of the corporation, and under them all subordinate officers serve. Two committees attend to the business of the corporation, a Finance Committee, and a Committee on Care of the Grounds. The area of the grounds is two hundred and four acres, finely diversified. The last purchase, of what was known as the Milton estate on the east of the main entrance at Morton St., and directly opposite Franklin Park, is a very valuable addition and being so near the entrance enables the Trustees to offer to their patrons better located lots than at any time since the establishment of the cemetery. The location is very commanding affording a fine view of Jamaica Plain, Brookline, and the surrounding country. The access to this new addition is by a rustic stone bridge of unusually fine proportions, and in most excellent taste, from designs by the well

known architect, W. G. Preston, of Boston. The material for the main part of the structure is the natural pudding stone quarried in the grounds; the cap stone and all the trimmings are of Medford granite. Several prominent citizens have already purchased lots on this new part of the grounds.

The diversity of the grounds and the natural features are of immense advantage in laying them out; nature has lavishly bestowed upon them many fine features, especially in large and conspicuous boulders and natural rock surfaces, all of which have been retained, adding very much to the general effect of the grounds. An interesting and attractive feature is the grotto, or rockery, as many call it, all the rocks, of which there is a great abundance, remaining in their natural positions. This place has been improved by winding paths to the summit, where a rustic summer house is located, affording a delightful resting place. On a projecting point a bridge and a lookout enables the visitor to obtain a fine view of Lake Hibiscus, and the surrounding portion of the grounds. The ornamentation is of hardy shrubs and choice hardy and native plants and ferns, additions to which are constantly being made as the plants are re-arranged and opportunity offers. The highest point at the head of the grotto is Mount Dearborn. On Sweet-Brier path, which forms a part of this elevation is the lot in which Gen. Dearborn is interred. On it is a handsome marble vase bearing the name, "H. A. S. Dearborn," and on the base which supports it is the inscription:

"Erected by the workmen of Forest Hills Cemetery
to commemorate his many virtues."

This inscription tells the story of the monument in a simple and appropriate manner, and the flowers with which the vase is supplied testify to the sincerity of the tribute.

On the summit of the hill, but a few steps from this lot, is the Dearborn monument erected by his friends and fellow citizens. It is an elegant Corinthian column, of white marble, on a base which extends by scrolls on each side to smaller pedestals bearing funeral urns; the shaft is decorated with convex flutings; the capital is elaborately wrought, and is surmounted by a funeral urn with flame. On the front of the base is a raised tablet inscribed as follows:

"H. A. S. Dearborn,
Obiit Julii 29, 1851,
Ætat. 69."

On the opposite side, in a panel, is the brief, but expressive Latin inscription,

"Ossa in terra
quam dilexit, coluit, ornavit,
cives et amici mœrentes
condimus."

The monument is appropriate to the character and tastes of him in whose honor it is erected. It is in a lovely spot, not only bearing his name, and near the burial place of his kindred, but one which was with him a place of frequent resort while he was spared to watch the progress of the Cemetery.

As the most distinguished person whose remains were originally interred at Forest Hills Cemetery, and as the designer of the cemetery, if not its originator; also as the first President of the Massachusetts Horticultural Society, it seems proper that more than a mere passing notice should be given of his eminent services, which we copy from the early history of the cemetery.

In what is known as the old grounds, the improvements have been quite marked the past few years; nearly all the iron fences have been removed, and many of the unsightly granite curbings, and as far as possible the abrupt terraces have been removed, and gentle slopes substituted; large and worthless trees, of which there were many, have been cut down, and replaced with smaller trees and shrubs. The grass has greatly improved where this work has been done. In many places grass walks have been substituted for gravel, for in summer time when people visit the grounds most frequently, grass is much pleasanter than gravel to walk upon, and a grass walk adds greatly to the appearance of the grounds, as compared with gravel. For several years no gravel walks have been made.

Forest Hills is by no means a Lawn Cemetery, as some of the more modern cemeteries are termed, but it is a Garden Cemetery. The early history of the place indicates that this was the intention of the projectors. From the only written history, we copy the following: "One of the attractive features at Forest Hills is the profusion of flowers which bloom in some parts of it, making it in truth a Garden Cemetery. In most of the borders attached to the lots there are flowers in more or less abundance, besides which there are numerous triangles formed by the intersection of avenue

or paths, and other spots not quite adapted to burial lots which are prepared as flower borders, or are planted with various flowering shrubs." By this it will be seen that flowers were to form a very prominent feature in the attractions at Forest Hills, and to this time it is the same and will continue so notwithstanding the fact that some think they are a thing of past generations, and should have but a small place, if any, in the modern cemetery. In the triangles no tender plants are used, and evergreens now form a very attractive and pleasing feature at these places. Shrubs, both evergreen and deciduous have been introduced wherever they could be judiciously used; hardy plants form no small part of the ornamentation of the grounds. Tender plants are used but little beyond the private lots; there are so large a proportion of the proprietors who require them, that we can well afford to substitute other styles of planting in the ornamental beds. Sub-tropical beds when properly arranged are very attractive, and have been used to good advantage. The new flowering Cannas are freely used, and since we have found that Crotons will do well as bedding plants, they have been substituted for Coleuses. As handsome foliage plants the Acalyphas have no equal, and are certainly, like the Crotons, far superior to half-faded and sickly looking Coleuses. Half-hardy plants are found of much value, as they can be taken out at least a month earlier than the bedding plants, and remain out a month later. For the accommodation of these plants, a pit has been built the past season 80×25 feet, and is already filled with a good collection of plants, among which are fine specimens of Hollies, Myrtles, Yews, Aucubas, Laurels, Laurustinuses and the tender Retinosporas, etc.

The first Greenhouse was built in 1860; in 1868 it was removed and enlarged; in 1873 a large conservatory was built, with ranges of smaller houses. These were all heavy wooden structures, which after twenty years of use were much decayed and not worth the large cost of repairing, so that in 1893 the entire range was rebuilt in the most approved style of construction by the Lord & Burnham Co., and has proved entirely satisfactory. The total number of houses is seven, with 4,480 feet of cold frames. Plants used for spring flowering are Pansies, Myosotis, Daisies, Silenes, etc., 15,000 in all; Geraniums, 40,000; French Cannas, 8,000; Begonias, 6,000; Salvias, 3,000; Echeverias, 2,000; Coleuses, 5,000; Achyranthes, 6,000; Golden Pilea, 2,000; Abutilons,

8,000; Grasses, 500; Peristrophe, 700; Ageratum, 2,000; Heliotrope, 3,000; Cupheas, 800; Alyssums, 1,500; *Celosia cristata*, 3,500; Torenias, 2,500; Nicotianas in variety, 700; Lantanas, 500; Lobelias, 200; Acalyphas, 2,000; Crotons, 2,000; a total number of 117,700.

A Receiving Tomb was built in 1871, and since that time has been greatly improved; a fine porch of elegant proportions adds greatly to the architectural appearance of the structure. In summer, large Palms are placed at the sides under each arch, giving a very pleasing effect, while on either side are arranged large beds of half-hardy plants. Opposite the tomb is a fountain, of elegant design, which was procured at the Centennial Exhibition in Philadelphia. Around this fountain special attention is given to ornamental bedding, this being an unusually appropriate place for such work. Around the natural rock at the base of the bell tower and observatory is a large border filled with a choice collection of hardy plants; this we consider a very interesting spot, for from early spring until late fall something is in flower.

It is not possible to enumerate the large collection of trees and shrubs in use: it would take up too much space, but all the choice flowering shrubs are used in large qualities.

The Observatory or Bell Tower is located on a prominent eminence opposite the main entrance. The lookout, which is reached by an easy flight of steps, affords a magnificent view of the surrounding country in all directions. The Chapel and Office were built in 1884, and form a very unique and convenient building. The Chapel is greatly admired, and is frequently used for funeral purposes; no description could do it justice, it must be seen to be appreciated. A system of water-pipes was introduced in 1891, throughout the grounds, satisfactory arrangements being made with the city for the supply of water.

The growing demands of the proprietors, with the constant increase of the unoccupied portions of the grounds, rendered a building necessary for their accommodation at the east entrance. This summer such a building was finished, and it is not only a great accommodation to the patrons of the place, but a unique and appropriate ornament to that part of the grounds.

For the care of the grounds when the sale of lots shall have ceased, provision is being made by setting aside a certain per cent from every sale now made. This is deposited in two funds, the

Perpetual Care and Permanent Funds; the first named for the care of the lots; the second for the buildings and avenues. These two funds have already attained a good sum, and will be ample in the future for the purposes for which they are intended. I have only given a very brief sketch of Forest Hills Cemetery, but certainly as much as the occasion calls for. Its fine location and attractive entrance, together with its immediate connection with Franklin Park, and the excellent drives from Boston insures for it a very promising future, and the citizens will find in the development of the grounds, that they can all be accommodated in their wishes, from those whose means are limited to others whom good fortune has blessed with a greater abundance.

Mrs. B. P. Cheney's Estate, South Natick.

The object of this visit, made on the 2d of November, was especially to see the Chrysanthemums, of which we found a good collection of well-grown plants. Mr. John Barr, gardener, informs us that he grew 700 to one stem and bloom, which were propagated in May and planted out in June. He grew them indoors all summer. There were over one hundred distinct named Japanese varieties and twenty Chinese in the collection. Mr. Barr considers that quite a number of the Japanese are not worth growing except as exhibition blooms; 500 were grown in boxes on account of the convenience of handling them, it being an easy and quick way of filling up the house, and as they are done flowering they can be cleaned out gradually and the space used for other purposes. The results of this mode of cultivation were quite as satisfactory as growing them on benches. For fertilizing, clay and sheep manure were used. Thirty plants, mostly Japanese varieties, were growing in twelve-inch pots. Those growing in boxes were particularly noticeable, and that mode of cultivation—new to at least a portion of your Committee — it seems to them might be adopted by many growers as an easy way of giving a place to this popular flower.

There are three greenhouses and two vineries, one of the greenhouses being used as a Rose house; another for growing Carnations, Cyclamens, Cinerarias, and other winter flowering plants; and the other for Palms and Foliage Plants for use in the summer season. The Palms and many other plants are placed in

the vineries, until the Chrysanthemums in boxes are removed. In spring all available space is filled up with bedding plants. We were glad to notice a fine lot of the lovely Adiantum Farleyense in a most luxuriant condition, the treatment being quite different from that usually bestowed upon this superb fern, which is generally consigned to the stove; in this case it was the opposite, being in a cool house with the ventilators raised on a chilly day, November 2.

The estate contains about two hundred acres, largely in woods and grass; twenty-five or thirty acres have been thoroughly trenched and laid down into a lawn. A feature of the place is the many beautiful views. We hope in our next report to give a description of this fine estate, the day of our visit being so very wet that we could get scarcely any idea of the extent or beauty of the grounds. We found Mr. Barr a progressive man and a good grower, and accord to Mrs. Cheney our most hearty thanks for this delightful and profitable visit.

William Nicholson's Chrysanthemum and Carnation Houses, Framingham.

The last visit of the Committee was on the 4th of November, to William Nicholson's Chrysanthemum and Carnation houses, in regard to which he has favored us with the following letter:

Framingham, Mass., November, 1895.

John G. Barker, Esq.:

Dear Sir:—In reply to your request for a few items in regard to the culture of Chrysanthemums and Carnations on my place, I will say that the cuttings for my Chrysanthemums were struck the last of May and the first two weeks in June; potted into two and a half-inch pots, and planted out on benches July 26, after my crop of Tomatoes was through. The compost was made early in the spring, of one load of good rotted horse manure to four loads of loam, with two bucketfuls of fine bone meal to every five loads of loam and manure. After they began to show buds we fed once a week with liquid bone manure; once or twice with hen manure, and top dressed once with sheep manure. We plant six by eight inches apart on benches. The varieties that I deem best for market, for which strength of stem is most considered, are:

Yellow.—Early; Yellow Queen and Gold Lode. Late; Major Bonnaffon, W. H. Lincoln, and H. Lippincott.

White.—M. Bergman, Ivory, Mrs. Jerome Jones, Niveus, Pelican, and Minnie Wanamaker.

Pink.—Mrs. S. T. Murdock, Helen Bloodgood, Ada Spaulding, Viviand Morel, and Lady Playfair.

Dark Red.— Mrs. John Shrimpton and Cullingfordii.

These I consider best for Boston market. I think that Ermenilda will be a good pink variety for this market when it becomes better known, but it should not be grown to single stems on late-struck cuttings.

In regard to Carnations I will give you my mode of cultivation. The cuttings are taken for general stock for winter forcing from February 14 to April 1; pricked out in flats, which I prefer to pots; placed in cold frames about April 20, and planted out in the field from May to June 10. I have had splendid plants for fall use struck in April and planted in the field June 10. I prepare my ground in the following manner:

It is ploughed in the fall, about the middle of November, and left in the rough till spring; then I put on about once in three or four years eight barrels of lime to the acre, in heaps of say half a bushel. As soon as it is all powder, which will be in about ten days, or earlier if it rains, I spread all over the ground thinly. I put on about one ton of wood ashes to the acre and about five cords of manure, and plow it in about seven inches just before I plant out. I harrow it smoothly and plant the Carnations in beds, eighteen inches between the rows and fifteen inches between each plant in the row. Every fourth row I leave two feet, which makes it very handy to take out the weeds in summer. I think that it is owing to the lime and wood ashes that I am so free from all kinds of diseases, and that they present a glaucous appearance.

In regard to stopping, one must be governed by the kinds he grows and the time when he wants the flowers for market. Some kinds do not need stopping after July 25; others will need it until the last week in August.

The preparation of the loam for benches is as follows: plough up sod ground in the fall; get a car of good rotted horse manure from horses that are heavily grain fed; add one horse load of manure to four of loam, and two buckets of pure bone flour without acid; repeat that till your pile is large enough; turn two or three times and add two buckets of wood ashes to every five loads

(one horse loads). I always have my benches well washed with water and then give them a heavy coat of hot whitewash from fresh lime.

I begin to take in my plants September 1, and plant in the house about ten by twelve inches apart — a little more or less, according to the size of the plants, and after they are planted in the house syringe once in two weeks with four ounces of salt to three gallons of water, and the alternate week with the following formula: one pound of sulphate of copper in powder, and one quart of concentrated ammonia dissolved together in an earthern jar with water enough added to make three gallons. Keep it all perfectly air tight. Take a two-inch potful of this mixture and at the same time half a two-inch potful of clear ammonia and syringe alternate weeks with the salt mixture.

I also mulch my carnations about twice in the season with a light dressing of sheep manure.

As Mr. Nicholson has entered his Carnation house for the prize offered by the Garden Committee for 1896, we will not make any comments on the very excellent house which we saw when there on the 4th of November, except to say that it was a model of neatness and gave every evidence of thorough practical cultivation.

The Committee have made the following awards:

Society's Prizes.

For the best Vegetable Garden, to Nathaniel T. Kidder, Milton	$50 00
For best Fruit Garden, to W. D. Hinds, Townsend, for a superior Peach Orchard	50 00
For the second best to C. S. Pratt, Reading, for a Market Strawberry Garden	30 00
For the best house of Chrysanthemums arranged for effect with other plants, to Nathaniel T. Kidder, Milton	50 00
For the second best to Mrs. B. P. Cheney, South Natick	30 00
For the best house or houses of Chrysanthemums grown on benches, to William Nicholson, Framingham .	50 00

Gratuities.

To J. W. Manning, Reading, for a superior collection of named Herbaceous Plants	35 00
To Mrs. J. W. Clark, Pomfret, Ct., for successful cultivation of Exotic Grapes	35 00
To Mrs. B. P. Cheney, for a house of Chrysanthemums grown in boxes	35 00
To William Nicholson, Framingham, for superior cultivation of Carnations	35 00
To A. J. Hinds, Townsend, for a well-cultivated and promising young Peach Orchard	35 00
To John G. Barker, Superintendent of Forest Hills Cemetery, for a well-kept and best-arranged Rural Cemetery, with choice Evergreens and Hardy and Tender Plants	50 00
Amount appropriated	$500 00
Amount awarded	485 00
Balance unexpended	15 00

For the Committee on Gardens,

JOHN G. BARKER, *Chairman.*

REPORT

OF THE

COMMITTEE OF ARRANGEMENTS,

FOR THE YEAR 1895.

By J. H. WOODFORD, Chairman.

We are glad to be able to report a prosperous year for the exhibitions of the Society just closed. The various and numerous shows during the year have at times taxed the ingenuity of your Committee to find space in the halls for the proper display of the various classes offered by the exhibitors, and then have space enough left for the comfort of visitors.

This state of things does not reflect any credit on the foresight of the Committee having our property in charge, for when we take into consideration the poor accommodations at our disposal and the very meagre net income that we receive from an investment of half a million of dollars, it seems to us that we ought to have very much better accommodations and vastly superior facilities for our shows out of an investment of half the money. This same inadequacy of accommodation has been repeatedly referred to by the presidents of our Society, and by several chairmen of committees in their annual addresses and reports, and still, as far as our Society knows, no notice has been taken of their statements. We would suggest that the Committee having the building in charge

be called to account and their action or inaction be laid before the Society for its consideration.

The halls are not commodious enough for our great shows, and are also very difficult of access, particularly for aged persons, and there is no place for rest after anyone gets into them, except by climbing a third flight of stairs to the gallery.

We would recommend action in the immediate future with a view to acquiring a property of half the value of the present holding, and having a hall of easy access and of sufficient capacity to accommodate any and all of our exhibitions, and at the same time capacious enough to contain a large audience comfortably.

We have much pleasure in referring to the numerous commendations of exhibitors of Roses that we have received since we changed from the cumbersome, dirty boxes heretofore used in their display, to the clean bright glass vases owned by the Society. The change is decidedly to the advantage of this noble class of flowers.

We are also pleased to record the forming of an auxiliary society to ours called the Boston Mycological Club. This will be of immense advantage and value to all lovers of Mushrooms, as it will educate people to distinguish the Edible Fungi from the Poisonous.

There are at present great quantities of the edible kinds left untasted for fear that if eaten they might kill, but when the community is taught by object lessons to distinguish the good kinds from the bad, tons of this esculent vegetable will be consumed for food which now "goes to waste its sweetness on the desert air." We consider this as some progress in the right direction which we are making in the noble art of Horticulture.

The receipts for admission to the two exhibitions at which fees were exacted were larger than last year, but not nearly as large as they ought to be with proper facilities to make our shows attractive to the public.

The amount of money placed at the disposal of this Committee for extraordinary expenses has been judiciously expended and for the furtherance of the best interests of the Society. The halls have been well arranged during the season and in so judicious a manner as to produce but little friction among the numerous exhibitors.

The Treasurer shows by his books receipts		
for the Spring Exhibition	$409 00	
Chrysanthemum " . . .	1,016 50	
		$1,425 50
Expenses:		
Spring Exhibition	$268 72	
Chrysanthemum Exhibition . . .	400 85	
		669 57
Leaving a balance in the treasury of the Society of		$755 93

All of which is most respectfully submitted.

For the Committee,

JOSEPH H. WOODFORD,

Chairman.

REPORT

OF THE

Committee on School Gardens and Children's Herbariums,

FOR THE YEAR 1895.

SWAN SCHOOL GARDEN, MEDFORD.

The first systematic attempt to introduce school garden work into the schools of Medford was made at the Swan School, on the corner of Park and Washington streets, early in the season of 1895. The teachers and pupils entered into the spirit of the work with the utmost enthusiasm, and its success has inspired other schools in Medford with a desire for garden work, which it is hoped the School Committee will be able to gratify another season with means furnished by the city.

The special aim of our School Garden and Herbarium Committee being to arouse and foster an interest in, and love for native plants, particular pains were taken to aid the teachers and children of the Swan School in establishing a garden of wild plants; and the appended list shows how many of the choicer and rarer of our native shrubs, flowers, and ferns have been introduced during the first year, and indicates what the policy should be for future seasons.

The frequent visits of both teachers and children to the woods for the purpose of obtaining plants for the garden showed their interest in the work. But the large amount of land surrounding the schoolhouse, and the broad plan on which the garden was laid out, rendered it difficult to make the garden attractive, as a whole, in one season by the use of wild plants alone; therefore the use of cultivated plants was allowed, not only to ornament the grounds, but to add interest and furnish ready working material.

Swan School Gardeners, Medford.

Swan School Garden, Medford.

Norcross, M. J. Dwyer, and others interested in seeing the experiment of school garden work tried in Medford.

The educational value of such work is beyond question, and in some European countries is considered of sufficient importance to justify legal enactments establishing and providing for it as a necessary part of a school's equipment.

Not only do these gardens beautify school grounds and make the schools more attractive to the children, but they serve the purpose of supplying, close at hand, material for nature study of a diversified character. The plants and flowers attract a variety of birds and insects, so that the children, under the guidance of an intelligent teacher, may receive object lessons in natural history that they can get in no other way without great difficulty.

The success which has attended the George Putnam and Robert G. Shaw school gardens in Boston and this new garden in Medford should be an incentive for other schools to emulate the example thus set before them, and it is to be hoped that school committees will encourage their development and support wherever possible.

I resigned from the Medford School Committee last September, but I am not without hopes that the Committee will be able another year to continue the work so successfully begun.

The following list of the native plants set out is appended for future reference and comparison:

Catalpa speciosa.
Cladrastis tinctoria.
Liriodendron tulipifera.
Magnolia glauca.
Kalmia latifolia.
Calluna vulgaris.
Asclepias tuberosa.
Aster Novæ-Angliæ.
" " var. *roseus.*
Geranium Robertianum.
" *maculatum.*
Trillium grandiflorum.
" *erectum.*
Tiarella cordifolia.
Opuntia vulgaris.
Azalea nudiflora.
Azalea viscosa.
Viburnum lantanoides.
Rhododendron maximum.
Cornus Florida var. *rubra.*
Aquilegia Canadensis.
" *chrysantha.*
" *cœrulea.*
Arisæma triphyllum.
Claytonia Virginica.
Hepatica triloba.
Sanguinaria Canadensis.
Cypripedium pubescens.
" *parviflorum.*
" *spectabile.*
Viola Canadensis.
" *pedata.*
" *blanda.*

31 species and 2 varieties recorded.

Anemone nemorosa and some others brought by the children are not recorded.

FERNS.

Osmunda regalis.
" *cinnamomea.*
" *Claytoniana.*
Onoclea sensibilis.
" *Struthiopteris.*
Dicksonia pilosiuscula.
Phegopteris hexagonoptera.
" *polypodioides.*
Asplenium Filix-fœmina.
" *thelypteroides.*
" *angustifolium.*
" *Trichomanes.*
Woodsia Ilvensis.
Woodwardia Virginica.
" *angustifolia.*
Camptosorus rhizophyllus.
Pteris aquilina.
Polypodium vulgare.
Aspidium cristatum and var. *Clintonianum.*
" *Boottii.*
" *aculeatum* var. *Braunii.*
" *marginale.*
" *acrostichoides.*
" *Goldieanum.*
" *spinulosum* and var. *intermedium.*
" *Thelypteris.*
" *simulatum.*
" *Noveboracense.*

27 species, 3 varieties.

GEORGE E. DAVENPORT,

Sub-Committee, Swan School, 1895, to September

GEORGE PUTNAM SCHOOL GARDEN, ROXBURY.

The plants named below, numbering thirty species, were for the most part put into the garden during the warm season of 1895:

Spiranthes cernua.
Goodyera pubescens.
Clintonia borealis.
Cypripedium acaule.
Iris versicolor.
" *Pseudacorus.*
Maianthemum Canadense.
Moneses grandiflora.
Pyrola elliptica.
" *secunda.*
Chiogenes serpyllifolia.
Solidago arguta.
Aster paniculatus.
Anaphalis margaritacea.
Gnaphalium polycephalum.
Achillea millefolium var. *roseus.*
Potentilla Norvegica.
" sp.
Cornus Canadensis.
Medeola Virginiana.
Oxalis Acetosella.
Viola rotundifolia.
Linnæa borealis.
Aralia trifolia.
Asarum Canadense.
Thalictrum purpurascens.
Hedeoma pulegioides.
Parnassia Caroliniana.
Woodwardia Virginica.
" *angustifolia.*

Some cultivated plants have been added, and half a gross of hyacinth and tulip bulbs were planted in October; but the stress of the work done has been in furnishing ample means for studying wild plants as they grow.

The pupils of the first class have studied fifteen species of ferns by means of pressed specimens, specimens brought in for the lesson, lantern slides of three kinds,—first of the reproductive organs, second, of pressed specimens, third, of growing clumps in their native habitats, — and lastly by observing all the species growing in the school garden. They have studied them about six weeks, have drawn and studied all the minute parts, spores, sporangia, indusia, sori, pinnules, pinnæ, rachis, stipe, general shapes, textures, and relative positions of parts. Most of the drawing has been done on the board off-hand on call. Every pupil made a sheet of drawings of such characteristic parts as he chose; some of the drawings were colored, and the best were put

Children Observing in George Putnam School Garden.

Children Observing in George Putnam School Garden.

on exhibition at the Mechanics' Fair. Every pupil at the end of his study wrote a composition on ferns, and it remained an uncorrected first draft.

Various classes in the school during the autumn studied composite flowers and the distribution of seeds, by means of the material obtained in the school garden and by visiting it. The dahlia tubers and gladiolus corms have aided two classes in the fall study of roots.

The garden has been established five years, and the size, beauty, and vigor of the plants must be ascribed no less to proper time in which plants can grow than to good care and changing them to suitable conditions. During these five years an attempt has been made to carry out the instructions of the Committee, namely, to stock the garden with wild native plants and economic plants, to illustrate the actual use made of the garden by means of children's graphic work, and to present photographs of such plants as would give the Committee a somewhat adequate idea of the contents and condition of the garden.

Some cultivated plants, although not required, have been introduced to play a minor part, chiefly for the ornamentation of the grounds and the decoration of teachers' desks. The cultivated plants have not been named, but each native wild plant bears a copper-wired tree-tag on which its name is written.

No attempt has been made to arrange the wild native plants, such as asters, golden-rods, and ferns, in decorative or ornamental beds; first, for the reason that the Committee in their instructions have expressed their disapproval of mere ornamental beds; and, second, for the reason that beds of any considerable size have been found to be of little use for practical work. When fifty-six pupils at a time are to study growing plants the plants must be accessible, and therefore scattered as much as is consistent with other conditions, especially that of caring for the plants and mowing the grass about them. Three or four times as many children can examine twenty plants set in rows as can examine them arranged in a bed; and the work of weeding the plants and cutting the grass in the former arrangement is not half as much as in the latter.

During the long summer vacation the janitor of the school building weeds and waters the plants and cuts the grass periodically. In spring and autumn he wheels in and spreads fertilizing

material, prepares new beds or rows, and resets old ones. For this work he receives ten dollars every year. When a garden has been established five years and has received yearly many additional plants, the labor involved is considerable, and it should be kept at a minimum for the salvation of the garden.

From five to eight dollars' worth of fertilizer is put into the garden at a time; this year six dollars' worth. The first prize of fifteen dollars awarded to the garden has defrayed these expenses up to this time. By this it will be seen that the garden is put on an economical and useful basis in accordance with the practical experience that comes from adapting means to ends.

H. L. CLAPP, *Principal.*

CHILDREN'S HERBARIUMS.

The Exhibition of Children's Herbariums, November 29 and 30, 1895, was the most satisfactory exhibition of its kind that has been held in Horticultural Hall. The various packages of pressed plants were sent to the Committee very plainly and adequately labelled, so that the allotment of space necessary to keep each collection unbroken and the laying-out of the specimens were made comparatively easy. The somewhat explicit instructions in the circulars of the Committee were closely carried out.

The number of exhibitors, as well as the number of specimens, was smaller than in 1894, but the quality of their work was much superior. Some remarkable examples of pressing, mounting, and preserving the natural colors of flowering plants were exhibited, especially in Arthur E. French's collection of 125 specimens, which were selected from a collection numbering 200 specimens that were changed to fresh paper every day during the pressing process. The preservation of the colors of the flowers was probably due to that careful work. Master French took the first prize for twenty ferns at our Exhibition in 1894.

Arthur C. Faxon exhibited highest grade work in sedges, grasses, and leaf sprays of shrubs. His combination of scientific and artistic arrangements and naming were beyond criticism. It was his fourth exhibition of herbarium specimens.

Gordon Weinz, a little boy eight years old, took the second prize for fifty flowering plants. His interest in the other children's collections was pleasant to see.

Phillips Barry contributed this year for the fourth time, and gave evidence of his earnestness, industry, and knowledge, in the form of one hundred flowering plants that he had not previously exhibited, among them being fourteen orchids, some of which are quite rare.

The fern collections, though not large, were of fine quality, and the labelling in vertical writing was the finest ever seen at our exhibition, especially that done by Theresa Cohn and Lulie D. Ellis. The ferns of the latter exhibitor were exceptionally fine.

From such work every observer and exhibitor may learn that care in every particular is necessary to insure a fine exhibit.

The labelling was much more correct than in any previous year of our exhibition; but the Committee were unable to identify some rare specimens, owing to a lack of such herbarium specimens as it was suggested last year that this Society should have for permanent reference.

In 1894 twenty-eight children exhibited sheets of leaves, two on a sheet, to the number of eight hundred. The work bore evidence of haste and transitory interest, and the Committee concluded that it was not of sufficient educational value to be continued. They restricted the work on leaves to sprays mounted on regular botanical sheets, which are twice the size of the sheets used by the children for leaves last year; consequently, a large number of leaf contributors dropped out, there being but one contributor this year. Nevertheless, the quality of the whole exhibition has been obviously improved.

Sedges, grasses, and ferns, which require more careful study and are more difficult to name correctly than flowering plants, taken together were more numerous than last year. There was a gain in sedges and grasses and a loss in ferns. Sedges and leaf sprays of shrubs were displayed at our exhibition this year for the first time.

The service that some of these young botanists have rendered and are likely to render in botanical work may be indicated by mentioning some of the donations of herbarium specimens which they have already made. The following notice was taken from the "Jamaica Plain News:"

"Arthur C. Faxon of School street, has lately made and presented to the George Putnam school a most valuable collection, consisting of the pressed and mounted leaves of eighty-four native trees of Massachusetts. Many of the sheets contain the flower and fruit in addition to the leaves, and the specimens are so gracefully arranged as to testify to Master Faxon's artistic skill in grouping, while the careful mounting and labelling make the collection an instructive guide to a knowledge of our own trees. Such earnest and accurate work cannot fail to have a stimulating effect upon the many children whose privilege it will be to examine it, and the school is much indebted to Master Faxon for this important waymark in its study of nature."

Already the teachers of the school in their work with leaves have often had the privilege of examining the collection.

At the close of our last exhibition Phillips Barry presented to the George Putnam school eighty-seven exhibition specimens of flowering plants and ferns. These will form an important addition to the working material of the school.

Miss Ann E. Newell of South Boston, has presented to the same school some pressed specimens of rare ferns from the island of St. Helena. The gift was suggested by her seeing our exhibition.

Even in these young botanists we can discern the spirit of the scientist. No sooner does he learn the secrets of nature than he desires to share his knowledge with others. So he gives his time and material. Some of these young people may become eminent in the future, and we hope this Society may have occasion to refer with pride to the steady encouragement it gave them at the beginning of their botanical work.

The encouragement given to the exhibition in the form of appreciative and generous notices by the representatives of the daily newspapers is well worth mentioning. Undoubtedly the excellent attendance on the second day was largely owing to those notices.

This year premiums for school herbariums are offered. A few pupils in many schools will be able to contribute specimens for their own schools and the aggregate will be large. If an herbarium, with plants properly identified and labelled by the aid of our Committee, can be thus formed in each of many schools, teachers and pupils alike will be stimulated to carry out the work contemplated by the Committee, and at the same time have one of the most practicable means of continuing the work from year to year, although the teaching corps may change yearly. An attractive and permanent herbarium will be like a sheet anchor to hold the plant work to its true course.

PRIZES AND GRATUITIES AWARDED FOR SCHOOL GARDENS AND CHILDREN'S HERBARIUMS, 1895.

SCHOOL GARDENS.— George Putnam School, first and Robinson's "Ferns in Their Homes and Ours," special prize for the best collection of growing ferns.	$15 00
Swan School, Medford, second and "Ferns in Their Homes and Ours," special prize for the best collection of flowering plants.	12 00
Also special prize to Swan School for excellence of first year's work	5 00
CHILDREN'S HERBARIUMS. FLOWERS.— First prize for one hundred and twenty-five specimens, Arthur E. French	5 00
First prize for fifty specimens, Carrie P. Webber	2 00
Second prize for fifty specimens, Gordon Weinz	1 50
Gratuity for fifty specimens, Bertha Rowe	1 25
Gratuity for fifty specimens, Ethel M. Thomas	1 00
Special prize for one hundred additions, Phillips Barry	4 00
Special prize for twenty-five additions, Willis H. Weinz	1 00
GRASSES.— First prize for ten specimens, Phillips Barry	1 00
Second prize for ten specimens, Willis H. Weinz	50
Special prize for ten additions, Arthur C. Faxon	2 00
SEDGES.— First prize for thirty specimens, Arthur C. Faxon	3 00
First prize for twenty specimens, Arthur E. French	2 00
FERNS.—First prize for fifteen specimens, Lulie D. Ellis	3 00
Second prize for fifteen specimens, Christine L. Lewis	2 00
First prize for ten specimens, Bernice L. Dole	1 75
Second prize for ten specimens, Katherine Dewey	1 25
Gratuity for ten specimens, Mabel M. Wood	1 00
Gratuity for ten specimens, Theresa Cohn	1 00

Gratuity for ten specimens, Genevieve Goudy .	$1 00
Gratuity for ten specimens, Phillips Barry . .	1 00
Special prize for nine additions, Ethel M. Egan .	2 25
SHRUBS.—First prize for thirty specimens, Arthur C. Faxon	2 00
EXTRA AWARDS.— Arthur E. French for special excellence in pressing and mounting flowers . .	2 00
Arthur C. Faxon for special excellence in pressing and mounting leaves	1 00
Carrie P. Webber for excellence in pressing and mounting succulent plants	1 00
Miss Webber also placed on exhibition specimens of grasses and sedges, Gratuity . . .	75

Amount of Premiums for School Gardens . . .	$32 00
" " " " Herbariums . . .	34 25
" " Gratuities for Herbariums and excellent work	11 00
Total awards,	$77 25

OTHER EXPENDITURES.

Paper, printing, bulbs, expressage, exhibition expenses, garden appropriations, etc.	$73 36
Total, ...	$150 61
Balance of appropriation ($250) on hand, .	$99 39

HENRY L. CLAPP, Roxbury,
MRS. H. L. T. WOLCOTT, Dedham,
GEORGE E. DAVENPORT, Medford,
MISS KATHARINE W. HUSTON, Roxbury,
MRS. P. D. RICHARDS, West Medford,
WILLIAM P. RICH, Chelsea,
W. E. C. RICH, *Secretary*,
99 Moreland St., Roxbury, Mass.

Committee on School Gardens and Children's Herbariums.

REPORT OF THE DELEGATE

TO THE

Massachusetts State Board of Agriculture,

FOR THE YEAR 1895.

By E. W. WOOD, of West Newton, Delegate.

The Legislature of Massachusetts as early as 1819 took action for the aid and encouragement of Agricultural Societies by passing the following act:

An Act for the encouragement of Agriculture and Manufactures.

Sec. 1. Be it enacted by the Senate and House of Representatives in General Court assembled, and by the authority of the same, That every incorporated Agricultural Society within this Commonwealth which shall have raised by subscription of individuals, or which may hereafter raise by such subscription and put out to interest on public or private security the sum of one thousand dollars as a capital stock appropriated for the uses of said society, shall be entitled to receive in the month of October annually out of the treasury of this Commonwealth the sum of two hundred dollars; and also a proportionable sum annually for any greater sum which they should so subscribe and put out to interest as a capital: Provided, always that no agricultural society shall receive by virtue of this act within one year any greater sum than six hundred dollars.

Additional sections provide for the formation of new societies and the limitation of their boundaries; and also require all societies receiving the benefit of this act to file in the office of the Secretary of the Commonwealth annually, in the month of October, a certificate signed by the President and Treasurer of such society speci-

fying under oath the sum actually subscribed and put out to interest. Also to transmit to the Secretary's office in the month of January annually an official statement of their proceedings in relation to the expenditure of the money received from the State.

The above act with certain amendments required as the number of societies increased, and by the transfer of the work from the office of the Secretary of State to the office of the Secretary of the State Board of Agriculture, is substantially the law at the present time as it relates to the connection of the State with the Agricultural Societies.

On April 12, 1837, the Legislature passed the following Resolve:

Resolved, That His Excellency the Governor, by and with the advice of the Council is hereby authorized and requested to appoint some suitable and competent person whose duty it shall be under the direction of His Excellency the Governor, to make an Agricultural Survey of the Commonwealth, collect accurate information of the state and condition of its Agriculture and every subject connected with it, point out the means of improvement, and make a detailed report thereof with as much exactness as circumstances will admit.

Resolved, That a summary of such survey and examination shall be furnished to His Excellency the Governor every six months until the whole shall be completed; and at such other times, as shall be required, to be published in such way and manner as he with the advice of the Council shall deem to be expedient and useful; and he is authorized to draw his warrants from time to time, upon the treasury for such sums, as may be necessary to defray the expenses of said survey, and to enable the person, so appointed, to proceed in the execution of the duties, that shall be required of him; and to pay the same to him, not exceeding the sum of two thousand five hundred dollars per annum.

Rev. Henry Colman was appointed Commissioner on the 27th of the ensuing May. He published four reports, which were widely circulated in this country and attracted favorable attention abroad. The resolve was repealed and the office discontinued, by chapter 14 of the Resolves of 1841. In one of his reports Commissioner Colman made the first published suggestion of a State Board of Agriculture.

The commissioners to whom were referred the resolves of the Legislature of 1850, concerning the establishment of an agricultural school, etc., in their report in January, 1851, recommended the establishment of a State Department of Agriculture, which should sustain a similar relation to Agriculture and the schools connected with it, as the Board and Secretary of Education do to the primary schools.

In 1850, Hon. Amasa Walker, Secretary of the Commonwealth, wrote: "But something it is believed may be safely attempted, a beginning may be made, a Board of Agriculture may be established by the authority of the State; corresponding in its general features to the Board of Education. Such a board might at once be empowered to employ an able secretary whose whole time shall be devoted to the work of obtaining and diffusing information on the subject of agricultural education, and whatever else concerns the great farming interests of the Commonwealth."

The first meeting of the voluntary Massachusetts Board of Agriculture was held September 3, 1851, at the State House, Boston. The following list of officers for a permanent organization of the Board was reported and accepted: President, Marshall P. Wilder; Vice-Presidents, Henry W. Cushman, John W. Lincoln; Corresponding Secretary, Allen W. Dodge; Recording Secretary, Edgar K. Whitaker.

At the second meeting of the Board, January 14, 1852, it was

Resolved, That inasmuch as Agriculture is the chief occupation of her citizens, the Commonwealth, in the organization of its government, should be provided with a Department of Agriculture, with officers commensurate with the importance of the duties to be discharged, of the abilities to be required, and of the labors to be performed.

Through the earnest efforts of the Board and the active cöoperation of the agriculturists throughout the State, the Legislature of 1852, with great unanimity passed the following act.

ACTS 1852, CHAPTER 142.

An Act to establish a State Board of Agriculture.

Be it enacted by the Senate and House of Representatives in General Court assembled, and by the authority of the same as follows:

Sec. 1. A State Board of Agriculture is hereby established, to consist of His Excellency the Governor, His Honor the Lieutenant Governor, and the Secretary of State *ex officiis;* of one member from each of the Agricultural Societies in the Commonwealth that receives an annual bounty from the State, and of three members to be appointed by the Governor and Council. Said members shall hold their offices for three years, except as hereinafter provided; and the Governor and Council, and the Agricultural Societies as aforesaid, shall, within sixty days after the passage of this act, appoint said members; and afterward whenever vacancies shall occur.

Sec. 3. It shall be the duty of this Board to investigate all such subjects relating to improvement in Agriculture in this Commonwealth, as they may think proper; and they are hereby empowered to take, hold in trust, and exercise control over any donations or bequests that may be made to them for promoting agricultural education, or the general interests of husbandry.

All the societies receiving bounty from the State are required to award in premiums an amount at least equal to the amount received, and to hold every year three institutes, the Board furnishing one speaker to open the discussion.

Since 1863 the Board has held in December annual winter meetings continuing three days, in different parts of the State, when agricultural and horticultural subjects have been discussed; and an annual business meeting in February, when reports from the inspectors visiting the exhibitions of the societies are received, essays by members upon subjects selected at the previous meeting are read, and committees elected to perform the routine work of the year. The proceedings of these meetings are published in full, and fifteen thousand copies are distributed by the members of the Legislature, Agricultural and Horticultural Societies, Granges, and Farmer's Clubs throughout the State.

The work of the Board has been much increased within the past few years. In 1891 the Legislature passed an Act to provide for the Protection of Dairy Products, and to establish a State Dairy Bureau. The execution of the provisions of this Act was placed in the Board of Agriculture; also the duties required by an Act, passed in 1891, to authorize the State Board of Agriculture to collect and circulate information relating to Abandoned Farms;

also an act, passed in 1891, to provide against Depredations by the Insect known as the *Ocneria dispar* or Gypsy Moth. For carrying out the provisions of this act the State has already appropriated more than half a million dollars.

The officers of the Board are, a President, who is the Governor of the Commonwealth, two Vice Presidents, a Secretary, and eight Standing Committees; said committees to consist of five members each, except the Executive Committee, which consists of seven members being composed of the Chairmen of the seven other committees.

The eight Standing Committees are, an Executive Committee, a Committee on Agricultural Societies, a Committee on Domestic Animals and Sanitation, a Committee on the Gypsy Moth, Insects and Birds, a Committee on the Dairy Bureau and Agricultural Products, a Committee on the Agricultural College and Education, a Committee on Experiment and Station work, and a Committee on Forestry, Roads, and Roadside Improvements.

At the present time the number of members constituting the Board of Agriculture is forty-six.

E. W. WOOD,

Delegate from the Massachusetts Horticultural Society.

REPORT

TO THE

STATE BOARD OF AGRICULTURE,

FOR THE YEAR 1895.

By GEORGE CRUICKSHANKS, OF FITCHBURG.

The exhibitions of the Massachusetts Horticultural Society for 1895 have closed. The year has been one of advance in everything pertaining to horticulture in fruit, flower, and vegetable. The lectures delivered before this Society, in one of its halls, were well attended. Those of this season's course were as follows:

January 12. Days with our Birds, by Mrs. Kate Tryon, Cambridge.

January 19. Flower Pots and their Manufacture, by A. H. Hews, North Cambridge.

January 26. Fungous Diseases of Ornamental Plants, by Professor Byron D. Halsted, New Brunswick, New Jersey.

February 2. Hardy Plants and Shrubs and their Arrangement, by J. Wilkinson Elliot, Pittsburg, Pa.

February 9. Glass Houses, their Construction and Heating, by Henry W. Gibbons, New York.

February 16. Economic Entomology in Relation to Trees, Shrubs, and Plants in Parks and Private Grounds, by E. B. Southwick, New York.

February 23. Experimental Evolution amongst Plants, by Professor L. H. Bailey, Ithaca, New York.

March 2. A Talk on Gardens, by David Hill Coolidge, Jr., Boston.

March 9. Budding and Grafting, by Jackson Dawson, Arnold Arboretum, Jamaica Plain.

March 16. Tomatoes, by Professor W. M. Munson, Orono, Me.

March 23. Edible Native Fungi, by Hon. John M. Kinney, Boston.

March 30. Commercial Fertilizers, as applied to Horticulture, by Professor W. H. Jordan, Orono, Me.

The amount appropriated to be awarded in Prizes and Gratuities during the year 1895, was $8,250.

The Spring Exhibition began March 26, and continued four days. The Upper Hall was devoted to a fine show of pot plants, comprizing the different classes of Spring Flowering Bulbs, such as Hyacinths, Tulips, Narcissuses, and Jonquils, and a fine display of Cinerarias, Cyclamens, Orchids, and Azaleas. The Lower Hall was devoted to an excellent show of cut flowers and early vegetables.

The Annual Exhibition of Fruits and Vegetables began October 2, continuing two days. The show of fruit has not been surpassed by this Society; many of the specimens were of extra size and of fine form and color. The vegetables were all of excellent quality. Very large exhibits of Tomatoes and Potatoes were made.

The crowning exhibition of the year, the Chrysanthemum show, which is looked forward to with great interest by all lovers of the beautiful in flowers, opened November 5, to hold four days.

The Upper Hall was devoted to the display of pot plants. The Committee of Arrangements are entitled to much credit for the plan of arranging the plants in groups so as to give the best effects. Each exhibition of a group of plants arranged for effect was limited to one hundred and fifty square feet, the very liberal premiums offered bringing out the best.

On entering the Lower Hall, which was devoted to the cut flowers, several tall vases filled with large flowers of all the different colors met the eye of the visitor. The cut flowers were all of fine quality; the row of vases in front of the platform has not been equalled. The number of exhibitors was larger than heretofore; besides the growers of Massachusetts, those of New Hampshire, Connecticut, New York, and New Jersey entered the race for the coveted prizes. The Chrysanthemum show of 1895 for large flowers, fine form, purity of color, and robust, healthy foliage has not been equalled.

George Cruickshanks,
Delegate.

REPORT

OF THE

COMMITTEE ON THE LIBRARY,

FOR THE YEAR 1895.

Nothing startling has occurred in the affairs of the library during the year. As in former years there has been no difficulty in spending all our available funds to good advantage, and, as usual, a full list of all purchases, as well as of books and pamphlets received as gifts, will be found in the TRANSACTIONS in due time. It is not necessary to name many of these acquisitions here, but the completion of the Hortus Kewensis is an event of such exceptional importance that it deserves especial mention. Probably no work we possess will be more useful than this, which does for species what Bentham and Hooker's great work does for the genera of plants.

Another work, our Catalogue of Plates, is, we believe, of equal importance within the limits of our own library, and even outside of this place and Society it has proved of value and will be more and more so as time goes on. We are of opinion that no money the Society has appropriated has been spent to better advantage, and we take pleasure in stating that the advance made in it this year has been no less than in former years.

This report would hardly be recognized as emanating from the Committee on the Library if no mention were made of the lack of room; and yet it seems hardly necessary to speak of it with such an object lesson continually before our eyes. Wherever we look

we see books in places where no books should be, — on the tables and on the floor, and hundreds of other books there are which ought to be in sight but which are packed away behind others, just as they were last year and the year before and the year before that. "These things ought not so to be."

For the Committee,

W. E. Endicott,

Chairman.

If the arrangement of the Transactions generally adopted were kept up, the List of Library Accessions would here follow the Report of the Committee on the Library, but so much time is unavoidably required to prepare this list that, in order not to delay the printing of the Transactions, the Committee on Publication have directed that the List of Library Accessions be published in a separate pamphlet as Part III of the Transactions for 1895.

REPORT

OF THE

SECRETARY AND LIBRARIAN,

FOR THE YEAR 1895.

The report of the work in these departments is, from the necessity of the case, in many respects very similar in one year to that of another. The records of the Society as well as those of three Committees have been faithfully and acceptably kept, as also copies of the records of Prizes and Gratuities awarded. The abstracts of the lectures delivered before the Society have, as after every Meeting for Discussion during the preceding twelve years, been placed on the table on the succeeding Saturday. The Schedule of Prizes for 1895 was, as it has been every year for many years, ready at the beginning of the year, and that for 1896 will form no exception to this rule. That the publication of the TRANSACTIONS has not been equally prompt is due partly to the increase in size, especially in the most difficult part, the List of Library Accessions, which more than doubled in length in the three years from 1891 to 1894. This has conspired with other circumstances beyond my control to cause delay which, however unavoidable, is much to be regretted. The revision of the Constitution and By-Laws, extending over much more time and going through more changes than usual, added much to the work in the Secretary's department.

I have spoken of the great increase in the accessions to the Library, but this means not only more work in preparing the printed list, which may be considered as an annual supplement to the Catalogue published many years ago, but means more than

double the labor in collating the books, in looking out for the completion of series, in recording, in cataloguing, and in all that is required before they can be placed on the shelves ready for use by the members of the Society here and in their homes. Under the ideal administration this should be done as speedily as possible. It would seem that with proper facilities it should be effected, on the average, in a week after the books are received, but this has been found impossible, for two reasons, — first, the force employed is entirely insufficient, being no greater than before the extraordinary increase in rapidity of growth of the Library; and, second, the shelves are entirely inadequate to contain the books. From these two causes the work on the Library is continually hampered and embarrassed. We need not be surprised at the rapid increase of horticultural literature, for while research and publication in every other department of science and knowledge is more active than ever before, it would be strange if botany and horticulture should form an exception to this activity. It is not intended to question the statement of the Committee having in charge the provision of better accommodations for the Society that every effort within reason has been made, but on the contrary the difficulties in the way when this report was made, as well as those which have occurred since, are fully recognized. But it is submitted, with entire confidence, that until that time in the indefinite future, when adequate provision for all our needs shall have been made, it is absolutely necessary that some temporary provision be made for the bestowal of our books. If any proof of this statement is desired a glance around this room will supply it.

In this connection I wish to say that I have heard with much regret that members of the Society have been deterred by the crowded state of the Library Room from attempting to use the books when they desired. I hope that no one will be deterred by this or any other cause from asking for any book that he wishes to read or consult, in the assurance that if we cannot do for him all that he could wish, all those employed in the room will do everything in their power to facilitate his researches.

In former years, when both halls have been leased, this room has been the only resource in case of a Saturday exhibition of horticultural products. This contingency has not occurred for some time, but it is liable to occur again, and it is desirable to be

prepared for it, and not to be obliged to remove valuable books at a moment's notice, to the great danger of their injury. Moreover the question to what place they shall be removed, even for a few hours, is one not easily answered.

Among the more important additions to the Library during the year I would mention first, a set of Nature, in forty-seven volumes, the gift of Waldo O. Ross, a former Chairman of the Library Committee, whose zeal for the improvement of the Library has suffered no diminution in the seventeen years since his retirement, but there is no room in our bookcases for his valuable donation. Of those monumental works, the Index Kewensis and the Silva of North America, the former has been completed, and the latter has made good progress, volumes seven and eight having been placed on the shelves this year. Kniphof's Botanica in Originali, in four folio volumes, is interesting as being one of the first, if not actually the first, work of considerable extent in which the process of nature-printing was employed to illustrate plants. It was supposed that a copy in the library at Kew Gardens was unique in being colored, but the twelve hundred plates in ours are all colored, and it seems to be in every way as good a copy as that at Kew. That admirable work, Kerner and Oliver's Natural History of Plants has been completed. A set of the London Journal of Botany, which has long been a desideratum, as one member of a series forming substantially one work, all the others of which we have long possessed, has at last been secured, and a set, as far as published, of the later Annals of Botany has been purchased. A set of Ledebour's Flora Rossica, in five folio volumes, with five hundred colored plates, remarkable for the minuteness of the engraving, is among our most important acquisition in its line, and a set, in six octavo volumes, of William Gilpin's works on Landscape Gardening and Forest Scenery is a valuable addition to our collection of books on that subject. A set in sixteen volumes of The Gardener, a periodical edited by William and David Thomson, from 1867 to 1882, though less costly than the books above mentioned, finds an appropriate place in our library. Les Orchidées Exotiques et leur Culture en Europe, by Lucien Linden, and Le Livre des Orchidées, by the Comte de Kerchove de Denterghem, are two solid and valuable works on that family of plants. The great interest which has been awakened during the past year in Edible and Poisonous Fungi has led to the purchase of such works on that subject as

seemed most desirable. The number of Nursery and Seed Catalogues arranged during the year is probably greater than in any other year since we began to collect them. The whole collection has, during the year been alphabetically arranged and counted, and found to number over seven thousand.

The work of arranging and binding such books as were most in need has been steadily pursued. The periodicals annually bound form no small addition to our Library, and besides those a large proportion of the books bought are received in parts which require to be bound as soon as completed. The work of binding the agricultural newspapers, which for the last five years have been preserved as permanent additions to the Library, has not yet been begun, but it should not be much longer delayed.

ROBERT MANNING,
Secretary and Librarian.

TREASURER'S REPORT

FOR THE YEAR 1895.

MASSACHUSETTS HORTICULTURAL SOCIETY *in account current to December 31, 1895, with* CHARLES E. RICHARDSON, *Treasurer.*

1895.	DR.		
Dec. 31.	To amount paid on account of the Library, in 1895, viz.:		
	For books, periodicals, and binding .	$403 00	
	From income of Stickney Fund, expended for books	771 90	
			$1,174 90
	To amount paid Interest on Funds for Prizes, credited below	$1,892 72	
	To amount paid Interest accrued on $5,000 Bonds for Sinking Fund . . .	101 88	
			1,994 60
	To amount of Prizes awarded in 1894, paid in 1895, as follows:		
	For Plants, ...	$1,887 90	
	" Flowers, ...	2,301 70	
	" Fruits, ...	1,716 00	
	" Vegetables, ...	1,089 00	
	" Gardens and Greenhouses . .	385 00	
	" H. H. Hunnewell Prizes for Rhododendrons, ...	105 00	
	" H. H. Hunnewell Triennial Prize .	160 00	
			7,644 60
	To amount paid on account of Committee on School Gardens and Children's Herbariums		150 61
	Amount carried over, ...		$10,964 71

Amount brought over, ...		$10,964 71
To amount paid Salaries of Secretary and Assistant, and Treasurer .	$3,600 00	
" " Salaries of members of Committees	1,010 00	
" " for extra services in Library and on Transactions . .	821 05	
" " on account of Committee of Arrangements . . .	400 00	
" " on account of Committee on Publication and Discussion	265 00	
" " on account of Committee on Large, Old, and Interesting Trees	50 00	
" " for Labor, including Janitor and Fireman . . .	2,755 15	
" " $5,000 in Bonds of West End Street R. R. Co. . .	5,162 50	
" paid for Heating	572 08	
" " Taxes for 1895 . .	2,560 00	
" " Insurance . . .	68 56	
" " City Water Rates . .	117 40	
" " Card Catalogue of Plates .	100 00	
" " Repairs	662 06	
" " Lighting	953 31	
" " Incidentals . . .	695 15	
" " Stationery, Printing, and Postage . . .	1,321 22	
" " Commission . . .	6 25	
" " Furniture and Exhibition Ware	320 15	
" " Legal Services . . .	500 00	
" advanced to A. P. Loring . .	5,000 00	
" paid William Caselden . .	50 00	
		$26,989 88
Total payments in 1895		$37,954 59
Balance of Cash on hand, December 31, 1895 . . .		7,495 35
		$45,449 94

1895.	Cr.			
Jan. 1.	By Balance of account rendered December 31, 1894			$13,541 89
	By Receipts from Building in 1895, viz.:			
	Rent of Stores . .	$17,450 00		
	" Halls . .	5,752 68		
			$23,202 68	
	By Income from Mount Auburn Cemetery .		2,308 03	
	" Received Massachusetts State Bounty .		600 00	
	" " from Annual Exhibitions, gross amount .	$1,425 50		
	Less expenses .	669 57		
			755 93	
	" " from Admissions and Assessments		1,348 00	
	" Interest received on Bonds	$1,237 50		
	" " " on Deposits in Bank	74 69		
	" " " from all other sources	60 00		
			1,372 19	
	" amount received from sale of Transactions		3 00	
	" " " " sale of one copy of History		2 50	
	" " " " H. H. Hunnewell, 1894 prize money		20 00	
	" " " " sale of duplicate book		3 00	
	" Insurance		400 00	
	" Interest credited to the following Funds against charges above:			
	Samuel Appleton Fund, $1,000, at 5%	$50 00		
	John A. Lowell Fund, $1,000, at 5%	50 00		
	Theodore Lyman Fund, $11,000, at 5%, ...	550 00		
	Josiah Bradlee Fund, $1,000, at 5%	50 00		
	Benjamin V. French Fund, $500, at 5%	25 00		
	H. H. Hunnewell Fund, $4,000, at 5%	200 00		
	William J. Walker Fund, $2,354.43, at 5%	117 72		
Amounts carried over, . . .		$1,042 72	$30,015 33	$13,541 89

Amounts brought over, ...	$1,042 72	$30,015 33	$13,541 89
Levi Whitcomb Fund, $500, at 5%	25 00		
Benjamin B. Davis Fund, $500, at 5%	25 00		
Marshall P. Wilder Fund, $1,000, at 5%	50 00		
John Lewis Russell Fund, $1,000, at 5%	50 00		
Josiah Stickney Fund, as per indenture	700 00		
		1,892 72	
			31,908 05
			$45,449 94

E. & O. E.

CHARLES E. RICHARDSON, *Treasurer.*

Boston, December 31, 1895.

Approved:

H. H. Hunnewell,
A. Hemenway,
Francis H. Appleton,
} *Finance Committee.*

ASSETS AND LIABILITIES OF THE MASSACHUSETTS HORTICULTURAL SOCIETY,

December 31, 1895

ASSETS.

Real Estate,			$250,000 00	
Stereotype Plates and copies of History			257 00	
Chicago, Burlington & Quincy R. R. Bonds			1,500 00	
Sinking Fund			23,872 50	
Kansas City, Clinton & Springfield R. R. Bonds			1,980 00	
Notes Receivable			304 85	
Library			34,812 62	
Furniture and Exhibition Ware			6,988 91	
A. P. Loring			5,000 00	
Due from tenants, December 31, 1895			1,687 74	
Cash			7,495 35	
				$333,898 97

LIABILITIES.

Mortgage			$1,000 00	
Josiah Stickney Fund, payable to Harvard College, 1899			12,000 00	
Prize Funds invested in the Building, viz.:				
Samuel Appleton Fund	$1,000 00			
John A. Lowell "	1,000 00			
Theodore Lyman "	11,000 00			
Josiah Bradlee "	1,000 00			
Benjamin V. French "	500 00			
H. H. Hunnewell "	2,500 00			
William J. Walker "	2,354 43			
Levi Whitcomb "	500 00			
Benjamin B. Davis "	500 00			
		$20,354 43		
Prize Funds invested in Bonds:				
H. H. Hunnewell Fund	$1,500 00			
Marshall P. Wilder "	1,000 00			
John Lewis Russell "	1,000 00			
		3,500 00		
			$23,854 43	
Prizes for 1895, payable in 1896			8,250 00	
				45,104 43
Surplus				$288,794 54

CHARLES A. RICHARDSON,
Treasurer.

Membership Account of the Massachusetts Horticultural Society, December 31, 1895.

Life Membership per last report	556		
Added during 1895	23		
Commuted from Annual	8		
		587	
Deceased		24	
			563
Annual Members per last report	237		
Added during 1895	8		
		245	
Commuted to Life Membership	8		
Deceased	6		
Dropped for non-payment for two years	6		
Resigned	3		
		23	
			222
Present membership			785

INCOME FROM MEMBERSHIP.

23 new Life Members @ $30	$690 00
8 " Annual Members @ $10	80 00
8 commuted to Life @ $20	160 00
Annual assessments	418 00
	$1,348 00

CHARLES E. RICHARDSON, *Treasurer.*

Dr. *Massachusetts Horticultural Society in account with the Proprietors of the Cemetery of Mt. Auburn.* **Cr.**

For Sales and Improvements within the Cemetery for the year ending December 31, 1895.

To cost of filling up and improving land at Mt. Auburn for the year ending December 31, 1895, the Massachusetts Horticultural Society being charged with their proportion of the same:		
Birch, to Eagle and Cherry Avenues . .	$120 94	
Larch Avenue	247 88	
Glen Avenue	491 44	
	$860 26	
One quarter of $860.26 is	$215 07	
Balance due Mass. Horticultural Society .	2,308 03	
		$2,523 10
		$2,523 10

By sales in January	$385 00
" " February	545 00
" " March	——
" " April	1,190 00
" " May	2,298 00
" " June	1,516 00
" " July	538 00
" " August	385 00
" " September	906 40
" " October	420 00
" " November	1,490 00
" " December	845 00
	$10,518 40
Net amount received from Receiving Tomb . .	974 00
	$11,492 40
Deduct for Annual Expenses	1,400 00
	$10,092 40
Mass. Horticultural Society ¼ part of $10,092.40 .	$2,523 10

E. & O. E.

H. B. MACKINTOSH, *Treasurer.*

DECEMBER 31, 1895.

THE MASSACHUSETTS HORTICULTURAL SOCIETY
To the PROPRIETORS OF THE CEMETERY OF MOUNT AUBURN, *Dr.*

For one-fourth part of the following Expenditures, for grading new lands for sale during the year 1895:

Birch to Eagle and Cherry Avenues		
52½ days, men	$118 13	
¾ day, man and horse	2 81	
		$120 94
Larch Avenue (near Maple Avenue).		
31 days, men	69 75	
47½ days, man and horse	178 13	
		247 88
Glen Avenue.		
208 days, men	468 00	
6¼ days, man and horse	23 44	
		491 44
		$860 26
One-fourth of $860.26 is		$215 07

MOUNT AUBURN, December 31, 1895.

JAMES C. SCORGIE,
Supt. of the Cemetery of Mount Auburn.

I certify the foregoing to be a true copy of improvements for the year 1895, rendered by the Superintendent.

H. B. MACKINTOSH, *Treasurer.*

Massachusetts Horticultural Society.

OFFICERS AND STANDING COMMITTEES FOR 1896.

President.

FRANCIS H. APPLETON, of Peabody.

Vice-Presidents.

CHARLES H. B. BRECK, of Brighton. WALTER HUNNEWELL, of Wellesley.
AUGUSTUS PARKER, of Roxbury. BENJAMIN P. WARE, of Clifton.

Treasurer and Superintendent of the Building.

CHARLES E. RICHARDSON, of Cambridge.

Secretary and Librarian.

ROBERT MANNING, of Salem.*

Professor of Botany and Vegetable Physiology.

BENJAMIN M. WATSON, of Jamaica Plain.

Professor of Entomology.

SAMUEL H. SCUDDER, of Cambridge.

Delegate to the State Board of Agriculture.

E. W. WOOD, of West Newton.

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*Communications to the Secretary, on the business of the Society, should be addressed to him at Horticultural Hall, Boston.

Standing Committees.

Executive.

THE PRESIDENT, FRANCIS H. APPLETON, CHAIRMAN.

THE CHAIRMAN OF THE FINANCE COMMITTEE, H. H. HUNNEWELL, *Ex officio.*

WILLIAM C. STRONG.
WILLIAM H. SPOONER.
NATHANIEL T. KIDDER.
BENJAMIN C. CLARK.
WALTER HUNNEWELL.
CHARLES W. PARKER.
CHARLES F. CURTIS.

Finance.

H. HOLLIS HUNNEWELL, OF BOSTON, CHAIRMAN.

FRANCIS H. APPLETON.
AUGUSTUS HEMENWAY.

Lectures and Publication.

J. D. W. FRENCH, OF BOSTON, CHAIRMAN.

C. MINOT WELD.
BENJAMIN M. WATSON.

Library.

WILLIAM E. ENDICOTT, OF CANTON, CHAIRMAN.

GEORGE W. HUMPHREY.
EDWIN FAXON.
WALTER S. PARKER.
GEORGE E. DAVENPORT.

Plants.

AZELL C. BOWDITCH, OF SOMERVILLE, CHAIRMAN.

JAMES COMLEY.
WILLIAM ROBINSON.
JAMES WHEELER.
WILLIAM J. MARTIN.

Flowers.

J. WOODWARD MANNING, JR., OF READING, CHAIRMAN.

MICHAEL H. NORTON.
THOMAS C. THURLOW.
KENNETH FINLAYSON.
FREDERICK S. DAVIS.

Fruits.

E. W. WOOD, OF WEST NEWTON, CHAIRMAN.

CHARLES F. CURTIS.
O. B. HADWEN.
WARREN FENNO.
SAMUEL HARTWELL.
J. WILLARD HILL.
SUMNER COOLIDGE.

Vegetables.

CHARLES N. BRACKETT, OF WATERTOWN, CHAIRMAN.

CEPHAS H. BRACKETT.
P. G. HANSON.
VARNUM FROST.
WARREN H. HEUSTIS.
WALTER RUSSELL.
AARON LOW.

Gardens.

JOHN G. BARKER, of Jamaica Plain, Chairman.

CHAIRMEN OF THE COMMITTEES ON PLANTS, FLOWERS, FRUITS, VEGETABLES, AND ARRANGEMENTS, *Ex officiis.*

HENRY W. WILSON. JACKSON DAWSON.

For Establishing Prizes.

WILLIAM J. STEWART, of Winchester, Chairman.

CHAIRMEN OF THE COMMITTEES ON PLANTS, FLOWERS, FRUITS, VEGETABLES, AND GARDENS, *Ex officiis.*

MRS. P. D. RICHARDS.

Committee of Arrangements.

JOSEPH H. WOODFORD, of Boston, Chairman.

CHAIRMEN OF THE COMMITTEES ON PLANTS, FLOWERS, FRUITS, VEGETABLES, AND GARDENS, *Ex officiis.*

ROBERT FARQUHAR.

MEMBERS FOR LIFE.

Members of the Society and all other persons who may know of deaths, changes in residence, or other circumstances showing that the following list is inaccurate in any particular, will confer a favor by promptly communicating to the Secretary the needed corrections.

Information, or any clew to it, is especially desired in regard to members whose names are marked thus †.

Adams, Luther, Brighton.
Albro, Charles, Taunton.
Alger, Rev. R. F., Becket.
Allan, David, Boston.
Allen, Hon. Charles H., Lowell.
Ames, Frank M., Canton.
Ames, George, Boston.
Ames, Oakes, 2d, North Easton.
Ames, Preston Adams, Boston.
Amory, Charles, Boston.
Amory, Frederick, Boston.
Andrews, Charles L., Milton.
Andrews, Frank W., Washington, D. C.
Andros, Milton, San Francisco, Cal.
Appleton, Edward, Reading.
Appleton, Francis H., Peabody.
Appleton, William S., Boston.
Ash, John, Pomfret, Conn.
Atkins, Edwin F., Belmont.
Avery, Hon. Edward, Boston.
Ayling, Isaac, M. D., Brookline.

Bailey, Jason S , West Roxbury.
Bancroft, John C., Boston.
Banfield, Francis L., M. D., Worcester.
Barber, J. Wesley, Newton.
Barnard, James M., Malden.
Barnard, Robert M., Everett.
Barnes, Walter S., Somerville.
Barnes, William H., Boston.
†Barney, Levi C., Boston.
Barratt, James, East Pasadena, Cal.
Barrett, Edwin S., Concord.
Barry, William C., Rochester, N. Y.
Bartlett, Edmund, Newburyport.
Bates, Hon. Amos, Hingham.
Beal, Leander, Boston.
Becker, Frederick C., North Cambridge.
Beckford, Daniel R., Jr., Jamaica Plain.
Beebe, E. Pierson, Boston.
Beebe, Franklin H., Boston.
Beebe, J. Arthur, Boston.
Berry, James, Brookline.
Birchard, Charles, Framingham.
Black, James W., Cambridge.
Blake, Francis, Weston.
Blake, Frederick A., Rochdale.
Blakemore, John E., Roslindale.
Blanchard, John W., Dorchester.
Blaney, Henry, Salem.
Blinn, Richard D., Chicago, Ill.
Bliss, William, Boston.
Boardman, Samuel M., Milton.
Bocher, Prof. Ferdinand, Cambridge.
Bockus, Charles E., Dorchester.
Bosler, Frank C., Carlisle, Penn.
†Botume, John, Wyoming.
Bouvé, Thomas T., Boston.
Bowditch, Azell C., Somerville.
Bowditch, Charles P., Jamaica Plain.

Bowditch, James H., Brookline.
Bowditch, Nathaniel I., Framingham.
Bowditch, William E., Roxbury.
Bowker, William H., Boston.
Brackett, Cephas H., Brighton.
Brackett, Charles N., Watertown.
Bresee, Albert, Hubbardton, Vt.
Brewer, Francis W., Hingham.
Brigham, William T., Honolulu, Hawaii.
Brimmer, Martin, Boston.
Brooks, J. Henry, Milton.
Brown, Alfred S., Jamaica Plain.
Brown, Charles E., Yarmouth, N. S.
Brown, Edward J., Weston.
Brown, George Barnard, Brookline.
Brown, George Bruce, Framingham.
Brown, Jacob, Woburn.
Brown, John T., Newburyport.
Bullard, John R., Dedham.
Bullard, William S., Boston.
Burnett, Harry, Southborough.
Burr, Fearing, Hingham.
Burr, Matthew H., Hingham.
Buswell, Edwin W., Brooklyn, N. Y.
Buswell, Frank E., Brooklyn, N. Y.
Butler, Aaron, Wakefield.
Butler, Edward K., Jamaica Plain.

Cabot, Edward C., Brookline.
†Cadness, John, Flushing, N. Y.
Cains, William, South Boston.
Calder, Augustus P., Boston.
Campbell, Francis, Cambridge.
Capen, John, Boston.
Carlton, Samuel A., Boston.
Carr, Hon. John, Roxbury.
Carter, Charles N., Boston.
Carter, Miss Maria E., Woburn.
Cartwright, George, Dedham.
Chadbourne, Marshall W., Mount Auburn.
Chaffin, John C., Newton.
Chamberlain, Chauncey W., Boston.
†Chase, Andrew J., Lynn.
Chase, Daniel E., Somerville.
Chase, George B., Boston.
Chase, William M., Everett.
Cheney, Mrs Elizabeth S., Wellesley.
Child, Francis J., Cambridge.
Childs, Nathaniel R., Boston.
Choate, Charles F., Southborough.
Christie, William, Newton.
Claflin, Hon. William, Newtonville.
Clapp, Edward B., Dorchester.
Clapp, James H., Dorchester.
Clapp, William C., Dorchester.
Clark, Benjamin C., Boston.
Clark, J. Warren, Rockville.
Clarke, Miss Cora H., Jamaica Plain.
Cleary, Lawrence, West Roxbury.
Clough, Micajah Pratt, Lynn.
Cobb, Albert A., Brookline.
Cobb, John C., Milton.
Coburn, Isaac E., Everett.
Codman, James M., Brookline.
Codman, Ogden, Lincoln.
Coffin, G. Winthrop, West Roxbury.
Collamore, Miss Helen, Boston.
Converse, Elisha S., Malden.
Converse, Parker L., Woburn.
Coolidge, Joshua, Mount Auburn.
Cottle, Henry C., Boston.
Cowing, Walter H., West Roxbury.
Cox, Thomas A., Dorchester.
Coy, Samuel I., Boston.
Crawford, Dr. Sarah M., Roxbury.
Crocker, Miss S. H., Boston.
Crosby, George E., West Medford.
†Crowell, Randall H., Chelsea.
Cummings, Hon. John, Woburn.
Curtis, Charles F., Jamaica Plain.
Curtis, George S., Jamaica Plain.
Cushing, Livingston, Weston.
Cushing, Robert M., Boston.

†Daggett, Henry C., Boston.
Damon, Samuel G., Arlington.
Dana, Charles B., Wellesley.
Davenport, Albert M., Watertown.
Davenport, Edward, Dorchester.
Davenport, George E., Medford.
Davenport, Henry, New York.

Davis, John, Lowell.
Dawson, Jackson, Jamaica Plain.
Day, William F., Roxbury.
Dee, Thomas W., Mount Auburn.
Denny, Clarence H., Boston.
Denton, Eben, Dorchester.
Dewson, Francis A., Newtonville.
Dexter, F. Gordon, Boston.
Dickerman, George H., Somerville.
Dike, Charles C., Stoneham.
Doliber, Thomas, Brookline.
Dorr, George, Dorchester.
Dove, George W. W., Andover.
Dowse, William B. H., West Newton.
Draper, Hon. Eben S., Hopedale.
Durant, William, Boston.
Durfee, George B., Fall River.
Dutcher, Frank J., Hopedale.

Eaton, Horace, Cambridge.
Edgar, William W., Waverly.
Eldredge, H. Fisher, Boston.
†Eldridge, E. H., Roxbury.
Eliot, Charles, Brookline.
Ellicott, Joseph P., Boston.
Elliot, Mrs. John W., Boston.
Elliott, William H., Brighton.
Endicott, William E., Canton.
Endicott, William, Jr., Boston.
Everett, William, Dorchester.
Ewell, Warren, Dorchester.

Fairchild, Charles, Boston.
Falconer, William, Pittsburgh, Pa.
Farlow, Lewis H., Newton.
Farquhar, James F. M., Roslindale.
Farquhar, John K. M. L., Roxbury.
Farquhar, Robert, Boston.
Faxon, John, Quincy.
Fewkes, Arthur H., Newton Highlands.
Finlayson, Kenneth, Brookline.
Fisher, David, Montvale.
Fisher, James, Roxbury.
†Fisher, Warren, Roxbury.
Flagg, Augustus, Boston.
Fletcher, George V., Belmont.
Fletcher, John W., Chelsea.
Fletcher, J. Henry, Belmont.
Flint, David B., Boston.
Forster, Edward J., M. D., Boston.
Foster, Francis C., Cambridge.
Fottler, John, Jr., Dorchester.
Fowle, George W., Jamaica Plain.
Fowle, William B., Auburndale.
French, Jonathan, Boston.
French, J. D. Williams, Boston.
French, S. Waldo, Jamaica Plain.
French, W. Clifford, Newton.
Frohock, Roscoe R., Malden.

Galloupe, Charles W., Swampscott.
Galvin, John, Boston.
Gardner, George A., Boston.
Gardner, George P., Boston.
†Gardner, Henry N., Mount Auburn.
Gardner, John L., Brookline.
Gibbs, Wolcott, M. D., Newport, R. I.
Gill, George B., Medford.
Gillard, William, Harrison Square, Dorchester.
Gilmore, E. W., North Easton.
Gilson, F. Howard, Reading.
Glover, Albert, Boston.
Glover, Joseph B., Boston.
Goddard, A. Warren, Brookline.
Goddard, Joseph, Sharon.
Goddard, Mrs. Mary T., Newton.
Goodell, L. W., Dwight.
Gorham, James L., Jamaica Plain.
†Gould, Samuel, Boston.
Gowing, Mrs. Clara E., Kendall Green.
Gray, James, Wellesley.
Gregory, Hon. James J. H., Marblehead.
Greig, George, Toronto, Ontario.
Grey, Benjamin, Malden.
Guild, J. Anson, Brookline.

Hadwen, Obadiah B., Worcester.
Hall, Edwin A., Cambridgeport.
Hall, George A., Chelsea.
Hall, George R., M. D., Warren, R. I.
Hall, Lewis, Cambridge.

Hall, Stephen A., Revere.
Hall, William F., Brookline.
Halliday, William H., South Boston.
Hammond, Gardiner G., New London, Conn.
Hammond, George W., Boston.
Hammond, Samuel, Boston.
Hanson, P. G., Woburn.
†Harding, George W., Arlington.
Harding, Louis B., Stamford, Conn.
Hardy, F. D., Cambridgeport.
Harris, Charles, Cambridge.
Harris, Thaddeus William, A. M., Keene, N. H.
Hart, William T., Boston.
Harwood, George Fred, Newton.
Haskell, John C., Lynn.
Hastings, Levi W., Brookline.
Hatch, Mrs. C. S., North Cambridge.
Hatch, Edward, Boston.
Hathaway, Seth W., Marblehead.
Hawken, Mrs. Thomas, Rockland, Maine.
†Hazeltine, Hazen, Boston.
Hemenway, Augustus, Canton.
Henshaw, Joseph P. B., Boston.
Hews, Albert H., North Cambridge.
Heywood, Hon. George, Concord.
Hilbourn, A. J., Boston.
Hill, John, Stoneham.
Hittinger, Jacob, Mount Auburn.
Hoar, Samuel, Concord.
Hodgkins, John E., Portsmouth, N. H.
Hoitt, Hon. Charles W., Nashua, N. H.
Hollingsworth, Amor L., Milton.
Hollis, George W., Grantville.
Hollis, John W., Allston.
Holmes, Edward J., Boston.
Holt, Mrs. Stephen A., Winchester.
Horner, Mrs. Charlotte N. S., Georgetown.
Horsford, Miss Kate, Cambridge.
Hovey, Charles H., Pasadena, Cal.
Hovey, Stillman S., Woburn.
Hubbard, Charles T., Weston.
Hubbard, Gardiner G., Washington, D. C.
Hubbard, James C., Everett.
Humphrey, George W., Dedham.
Hunnewell, Arthur, Wellesley.
Hunnewell, Henry Sargent, Wellesley.
Hunnewell, H. Hollis, Wellesley.
Hunnewell, Walter, Wellesley.
Hunt, Dudley F., Reading.
Hunt, Francis W., Melrose.
†Hunt, Franklin, Boston.
Hunt, William H., Concord.
Hyde, James F. C., Newton Highlands.

Jack, John George, Jamaica Plain.
Jackson, Charles L., Cambridge.
Jackson, Robert T., Dorchester.
Janvrin, William S., Revere.
Jeffries, John, Boston.
Jenks, Charles W., Bedford.
Johnson, J. Frank, Boston.
Jose, Edwin H., Cambridgeport.
Joyce, Mrs. E. S., Medford.

Kakas, Edward, West Medford.
Kelly, George B., Jamaica Plain.
Kendall, D. S., Woodstock, Ont.
Kendall, Edward, Cambridgeport.
†Kendall, Joseph R., San Francisco, Cal.
Kendall, Dr. Walter G., Atlantic.
Kendrick, Mrs. H. P., Allston.
Kennedy, George G., M.D., Roxbury.
Kent, John, Brookline.
†Keyes, E. W., Denver, Col.
Keyes, John M., Concord.
Kidder, Charles A., Southborough.
Kidder, Nathaniel T., Milton.
†Kimball, A. P., Boston.
King, Franklin, Dorchester.
Kingman, Abner A., Brookline.
Kingman, C. D., Middleborough.
Kinney, John M., Boston.
Knapp, Walter H., Newtonville.

Lancaster. Charles B., Newton.
Lawrence, Amory A.. Boston.
Lawrence, Amos A.. Boston.
Lawrence, James, Groton.
Lawrence, John, Groton.
Learned, Charles A., Arlington.
Lee, Charles J., Dorchester.
Lee, Daniel D., Jamaica Plain.
Lee, Henry, Boston.
Leeson, Hon. Joseph R., Newton Centre.
Lemme, Frederick, Charlestown.
Leuchars, Robert B., Boston.
Lewis, William G., Framingham.
Lincoln, George, Hingham.
Lincoln, Col. Solomon, Boston.
Little, James L., Brookline.
Lockwood, Rhodes, Boston.
Lodge, Richard W., Swampscott.
Loftus, John P., Dorchester.
Loring, Caleb W., Beverly Farms.
Lovett, George L., West Newton.
†Lowder, John, Watertown.
Lowell, Augustus, Boston.
Luke, Elijah H., Cambridgeport.
Lumb, William, Boston.
Lunt, William W., Hingham.
Lyman, George H., Wareham.
Lyman, Col. Theodore, Brookline.
Lyon, Henry, M. D., Charlestown.

†Mahoney, John, Boston.
Mallet, E. B., Jr., Freeport, Maine.
Mann, James F., Ipswich.
Manning, Jacob W., Reading.
Manning, Mrs. Lydia B., Reading.
Manning, Robert, Salem.
Manning, Warren H., Brookline.
Marshall, Frederick F., Chelsea.
Matthews, Nathan, Boston.
McCarty, Timothy, Providence, R. I.
McClure, John, Revere.
McWilliam, George, Whitinsville.
Melvin, James C., West Newton.
Merriam, Herbert, Weston.
Merriam, M. H., Lexington.
Merrifield, William T., Worcester.
Merrill, Hon. Moody, Roxbury.
Metivier, James, Cambridge.
Milmore, Mrs. Joseph, Washington, D. C.
Minton, James, Boston.
Mixter, George, Boston.
Monteith, David, Dedham.
Moore, John H., Concord.
†Morse, Samuel F., Boston.
Mudge, George A., Portsmouth, N. H.
Murphy, William Bowen, Boston.

Nevins, David, Framingham.
Newman, John R., Winchester.
Newton, Rev. William W., Pittsfield.
Nickerson, George A., Dedham.
Norton, Charles W., Allston.
Norton, Edward E., Boston.

Oakman, Hiram A., North Marshfield.
Olmsted, John Charles, Brookline.

Packer, Charles H., Boston.
Paige, Clifton H., Mattapan.
Paige, John C., Boston.
Palmer, Julius A., Jr., Boston.
Parker, Augustus, Roxbury.
Parker, Charles W., Boston.
Partridge, Horace, North Cambridge.
Paul, Alfred W., Dighton.
Peabody, Francis H., Boston.
Peabody, John E., Boston.
Peabody, Col. Oliver W., Milton.
Pearce, John, West Roxbury.
Peck, O. H., Denver, Col.
Peck, William G., Arlington.
Peirce, Silas, Boston.
Perkins, Edward N., Jamaica Plain.
†Perry, George W., Malden.
Philbrick, William D., Newton Centre.
Pierce, Dean, Brookline.
Pierce, George Francis, Dorchester.
Pierce, Henry L., Boston.
Poor, John R., Boston.

Porter, Herbert, Malden.
Porter, James C., Wollaston.
Potter, Joseph S., Fredericksburg, Va.
Prang, Louis, Roxbury.
Pratt, Laban, Dorchester.
Pratt, Lucius G., West Newton.
Pratt, Robert M., Boston.
Pratt, William, Winchester.
Pray, Dr. Mark W., Boston.
†Prescott, Eben C., Boston.
Prescott, William G., Quincy.
Pringle, Cyrus G., Charlotte, Vt.
Prouty, Gardner, Littleton.
Putnam, Joshua H., Brookline.

Quinby, Hosea M., M. D., Worcester.

Raddin, Everett W., North Cambridge.
Rand, Miss Elizabeth L., Newton Highlands.
Rand, Harry S., North Cambridge.
Rand, Oliver J., Cambridgeport.
Rawson, Warren W., Arlington.
Ray, James F., Franklin.
Ray, Hon. James P., Franklin.
Ray, Hon. Joseph G., Franklin.
Raymond, Walter, Cambridgeport.
Read, Charles A., Manchester.
Reardon, John B., Boston.
Reed, George W., Boston.
Rice, George C., Worcester.
Richards, John J., Boston.
Richardson, Charles E., Cambridge.
Rinn, J. Ph., Boston.
Ripley, Charles, Dorchester.
Ripley, Ebed L., Hingham Centre.
Robbins, I. Gilbert, Melrose Highlands.
Robinson, John, Salem.
Robinson, Joseph B., Allston.
Robinson, Warren J., Somerville.
Ross, Henry, Newtonville.
Ross, Waldo O., Boston.
Ruddick, William H., M. D., South Boston.
Russell, George, Woburn.
Russell, Hon. John E., Leicester.
Russell, Walter, Arlington.

Salisbury, William C. G., Boston.
Sanford, Oliver S., Hyde Park.
Sargent, Charles S., Brookline.
Saville, Richard L., Brookline.
Sawtelle, Eli A., Boston.
Sawyer, Timothy T., Boston.
†Scott, Charles, Newton.
Sears, Miss Clara E., Boston.
Sears, J. Montgomery, Boston.
Shaw, Christopher C., Milford, N. H.
Shorey, John L., Lynn.
Shuman, Hon. A., Roxbury.
Siebrecht, H. A., New Rochelle, N.Y.
Skinner, Francis, Boston.
Smith, Benjamin G., Cambridge.
Smith, Calvin W., Wellesley Hills.
Smith, Charles H., Jamaica Plain.
Smith, Charles S., Lincoln.
Smith, Edward N., San Francisco.
Smith, George O., Boston.
Smith, Thomas Page, Waltham.
Snow, Eugene A., Melrose.
Snow, Miss Salome H., Brunswick, Me.
Spaulding, Edward, West Newton.
Spaulding, Hon. John P., Dorchester.
Speare, Alden, Newton Centre.
Spooner, William H., Jamaica Plain.
Springall, George, Malden.
Stearns, Frank W., Newton.
Stewart, William J., Winchester.
Stone, Amos, Charlestown.
Stone, Charles W., Boston.
Stone, George F., Chestnut Hill.
Strater, Herman, Roxbury.
Strong, William C., Waban.
Sturgis, Russell, Manchester.
Sturtevant, E. Lewis, M. D., South Framingham.
Surette, Louis A., Concord.
Swain, Charles E., Roxbury.
Swett, Evarell F., Malden.

Taft, John B., Cambridge.
Talbot, Mrs. I. Tisdale, Boston.
Tarbell, George G., M. D., Boston.
Taylor, Horace B., Portland, Me.
Temple, Felker L., Boston.
Thompson, Leonard, Woburn.
Thurlow, Thomas C., West Newbury.
Tilton, Stephen W., Roxbury.
Todd, John, Hingham.
Tolman, Benjamin, Concord.
Torrey, Everett, Charlestown.
Trepess, Samuel J., Brookline.
†Turner, John M., Dorchester.
Turner, Roswell W., Boston.

Underwood, William J., Belmont.

Vander-Woerd, Charles, Waltham.
Vinal, Miss Mary L., Somerville.

Wainwright, William L., Braintree.
Wakefield, E. H., Cambridge.
Walcott, Henry P.,M.D.,Cambridge.
Waldo, C. Sidney, Jamaica Plain.
Wales, George O., Braintree.
Walker, Edward C. R., Roxbury.
Walker, Miss Mary S., Waltham.
Walley, Mrs. W. P., Boston.
Walton, Daniel G., Wakefield.
Ward, Francis Jackson, Roxbury.
Ward, John, Newton Centre.
Wardwell, William H., Brookline.
Ware, Benjamin P., Clifton.
Ware, Miss Mary L., Boston.
Washburn, Andrew, Hyde Park.
Waters, Dr. George F., Boston.
Watson, Benjamin M., Jamaica Plain.
Watson, Thomas A., East Braintree.
Watts, Isaac, Waverly.
Webber, Aaron D., Boston.
Weld, Christopher Minot, Jamaica Plain.
Weld, George W., Newport, R. I.
Weld, Richard H., Boston.
Weld, William G., Boston.
West, Mrs. Maria L., Neponset.
Weston, Leonard W., Lincoln.
Weston, Seth, Revere.
Wheeler, Frank, Concord.
Wheelwright, A. C., Brookline.
Whitcomb, William B., Medford.
White, Francis A., Brookline.
White, Joseph H., Brookline.
Whitney, Arthur E., Winchester.
Whitney, Ellerton P., Milton.
Whitten, Charles V., Dorchester.
Whittier, Hon. Charles, Roxbury.
Wilbur, George B., West Newton.
Wilder, Edward Baker, Dorchester.
Wilder, Henry A., Malden.
Willard, E. W., Newport, R. I.
Willcutt, Levi L., West Roxbury.
Williams, Aaron D., Boston.
Williams, Benjamin B., Boston.
Williams, Philander, Taunton.
Willis, George W., Chelsea.
Willis, Joshua C., Roxbury.
Wilson, Col. Henry W., Boston.
Wilson, William Power, Boston.
Winthrop, Robert C., Boston.
Wood, Luke H., Marlborough.
Wood, William K., West Newton.
Woods, Henry, Boston.
Wright, George C., West Acton.
Wyman, Oliver B., Shrewsbury.

ANNUAL MEMBERS.

Members of the Society and all other persons who may know of deaths, changes of residence, or other circumstances showing that the following list is inaccurate in any particular, will confer a favor by promptly communicating to the Secretary the needed corrections.

Abbott, Samuel L., M. D., Boston.
Allen, Charles L., Floral Park, N.Y.
Alles, William H., Hyde Park.
Arnold, Mrs. Anna E., Roxbury.
Atkinson, Edward, Brookline.

Bacon, Augustus, Roxbury.
Badlam, William H., Dorchester.
Barker, John G., Jamaica Plain.
Beard, Edward L., Cambridge.
Benedict, Washington G., Boston.
Bigelow, Arthur J., Eastlake, Worcester.
Bigelow, Mrs. Nancy J., Southborough.
Bird, John L., Dorchester.
Bird, Mrs. Sarah Elizabeth, Roxbury.
Bliss, Benjamin K., East Bridgewater.
Bock, William A., North Cambridge.
Bolles, Matthew, Boston.
Bolles, William P., Roxbury.
Boyden, Clarence F., Taunton.
Breck, Charles H., Newton.
Breck, Charles H. B., Brighton.
Brooks, George, Brookline.
Brown, David H., West Medford.
Butler, Edward, Wellesley.

Carroll, James T., Chelsea.
Carter, Mrs. Sarah D. J.. Wilmington.
Chase, Joseph S., Malden.
Chase, Leverett M., Roxbury.
Chase, Philip A., Lynn.
Cheney, Amos P., Natick.
Chubbuck, Isaac Y., Roxbury.
Clapp, Henry L., Roxbury.
Clark, John Spencer, Boston.
Clark, Joseph, Manchester.
Clark, Theodore M., Newtonville.
Codman, Philip, Brookline.
Coleman, Mrs. S. H., Jamaica Plain.
Collins, Frank S., Malden.
Comley, James, Lexington.
Coolidge, David H., Jr., Boston.
Coolidge, Sumner, Mt. Auburn.
Cotter, Lawrence, Dorchester.
Councilman, Prof. W. T., Boston.
Crosby, J. Allen, Jamaica Plain.
Curtis, Joseph H., Boston.
Curtis, Louville, Tyngsborough.

Davis, Frederick, Boston.
Davis, Frederick S., West Roxbury.
Davis, Thomas M., Cambridgeport.
Dimick, Orlendo W., Watertown.
Dolbear, Mrs. Alice J., College Hill.
Doran, Enoch E., Brookline.
Doyle, William E., East Cambridge.
Duffley, Daniel, Brookline.

Eaton, Warren E., Reading.
Endicott, Miss Charlotte M., Canton.
Ewell, Marshall F., Marshfield Hills.

Faxon, Edwin, Jamaica Plain.
Felton, Arthur W., West Newton.
Fenno, Warren, Revere.
Fisher, Sewall, Framingham.
Fitzgerald, Desmond, Brookline.
Fletcher, Fred W., Auburndale.

Forbes, William H., Jamaica Plain.
French, Charles G., Utica, N. Y.
Frost, Artemas, Belmont.
Frost, George, West Newton.
Frost, Varnum, Arlington.
Fuller, T. Otis, Needham.

Gage, Alfred P., Arlington.
Gibbon, Mrs. James A., Brookline.
Gill, Mrs. E. M., Medford.
Grant, Charles E., Concord.
Grosvenor, Clarence E., Brooklyn, N. Y.

Haile, Hon. William H., Springfield.
Hall, Charles H., M. D., Boston.
Hall, Harry B., Dorchester.
Hall, Stacy, Boston.
Hall, William T., Revere.
Hargraves, William J., Jamaica Plain.
Harris, Miss Ellen M., Jamaica Plain.
Harris, Frederick L., Wellesley.
Hartwell, Samuel, Lincoln.
Hatfield, T. D., Wellesley.
Henshaw, Samuel, West Brighton, N. Y.
Hersey, Alfred H., Hingham.
Hersey, Edmund, Hingham.
Heustis, Warren H., Belmont.
Hewett, Miss Mary C., Canton.
Hill, Edwin S., Hyde Park.
Hill, J. Willard, Belmont.
Hobbs, George M., Boston.
Hollis, George, South Weymouth.
Horton, Herbert A., Brookline.
Houghton, George S., West Newton.
Hubbard, F. Tracey, Cambridge.
Hunt, Henry C., Newton.
Huston, Miss Katharine W., Roxbury.

James. Robert Kent, Dorchester.
Jameson. G. W., East Lexington.
Jordan, Hon. Jediah P., Roxbury.

Keith, Miss Mary R., Wollaston.
Kelley, Augustus H., Allston.
Kenrick, Miss Anna C., Newton.

Lancaster, Mrs. E. M., Roxbury.
Langmaid, Mrs. Mary, Somerville.
Lawrence, Henry S., Roxbury.
Lee, Francis H., Salem.
Lee, William W., Northampton.
Lomax, George H., Somerville.
Lombard, Richard T., Wayland.
Loring, Charles G., Boston.
Loring, John A., North Andover.
Lothrop, Thornton K., Boston.
Loud, Mrs. Mary E., Roxbury.
Low, Hon. Aaron, Hingham.
Lowell, John, Newton.

Manda, W. A., South Orange, N. J.
Manning, A. Chandler, Reading.
Manning, J. Woodward, Reading.
Markoe, George F. H., Roxbury.
Martin, William H., Dorchester.
Martin, William J., Milton.
Masten, Cornelius E., Roxbury.
May, F. W. G., Boston.
McDermott, Andrew, Roxbury.
McDowell, Mrs. Mary, Cambridge.
McLaren, Anthony, Forest Hills.
McMullen, Edgar, Boston.
Meredith, Albert A. H., Milton.
Meriam, Horatio C., D.M.D., Salem.
Merrill, John J., Roxbury.
Milman, William, Roxbury.
Munson, Prof. W. M., Orono, Me.

Newton, John F., Roxbury.
Nicholson, William, Framingham.
Norton, Michael H., Boston.
Norton, Patrick, Boston.

Olmsted, Frederick Law, Brookline.

Park, William D., Boston.
Park, William P., West Boxford.
Parker, John, Newtonville.
Parker, Walter S., Reading.

Patterson, William, Quincy.
Peirce, George H., Concord.
Peterson, Ellis, Jr., Jamaica Plain.
Petremant, Robert, New York, N. Y.
Pickman, Dudley L., Boston.
Pigott, Thomas E., Winthrop.
Plimpton, Willard P., West Newton.
Power, Charles J., South Framingham.
Prichard, Joseph V., Dorchester.
Purdie, George A., Wellesley Hills.
Putnam, Charles A., Salem.

Rich, Miss Ruth G., Dorchester.
Rich, William E. C., Roxbury.
Rich, William P., Chelsea.
Richards, Mrs. P. D., West Medford.
Robbins, Oliver R., Weston.
Robinson, Walter A., Arlington.
Robinson, William, North Easton.
Ross, Charles W., Newtonville.
Ross, Henry Wilson, Newtonville.
Rothwell, James E., Brookline.

Saunders, Miss Mary T., Salem.
Sawtell, J. M., Fitchburg.
Schmitt, Georg A., Boston.
Scott, Augustus E., Lexington.
Scudder, Samuel H., Cambridge.
Seaver, Edwin P., LL.D., Waban.
Sharples, Stephen P., Cambridge.
Shaw, Hon. Edward P., Newburyport.
Shedd, Abraham B., Waltham.
Sheppard, Edwin, Lowell.
Slade, Dr. Daniel D., Chestnut Hill.
Smith, Archibald, Somerville.
Souther, Charles H., Jamaica Plain.
Southworth, Edward, Quincy.
Squire, Miss Esther A., North Cambridge.
Stearns, Mrs. Charles A., East Watertown.
Stearns, Charles H., Brookline.
Stevens, Miss Mary O., North Andover.
Stone, Joshua C., Watertown.
Storer, Charles, Boston.
Story, Miss Sarah W., Allston.
Swan, Charles W., M. D., Boston.

Tailby, Joseph, Wellesley.
Talbot, Josiah W., Norwood.
Teele, William H., West Acton.
Terry, Rev. Calvin, North Weymouth.
Tobey, Rufus T., Roxbury.
Tobey, S. Edwin, Boston.
Travis, Charles B., Brighton.
Turner, Nathaniel W., Boston.
Tyndale, Theodore H., Brookline.

Vaughan, J. C., Chicago, Ill.

Warren, Samuel H., Weston.
Welch, Patrick, Dorchester.
Weld, Charles E., Roslindale.
Wells, Benjamin T., Newtonville.
Weston, Mrs. L. P., Danvers.
Westwood, Thomas H., Jamaica Plain.
Wheeler, James, Brookline.
White, Maurice P., Roxbury.
White, W. Henry, Lowell.
Whitney, Joseph, Cambridgeport.
Whiton, Hon. Starkes, Hingham Centre.
Wilcox, George D., M. D., Providence, R. I.
Wilmarth, Henry D., Jamaica Plain.
Wilson, B. Osgood, Watertown.
Winter, William C., Mansfield.
Wolcott, Mrs. Henrietta L. T., Dedham.
Wood, Mrs. Anna D., West Newton.
Wood, Elijah A., West Newton.
Wood, E. W., West Newton.
Woodford, Joseph H., Boston.
Woods, Henry F., Boston.
Worthington, Roland, Roxbury.

Young, Arthur W., Hingham.
Young, Charles S., Newton Centre.
Young, E. Bentley, Boston.

Zirngiebel, Denys, Needham.

EXTRACTS FROM THE CONSTITUTION AND BY-LAWS.

SECTION XXII.

Life Members.

The payment of thirty dollars shall constitute a Life Membership, and exempt the member from all future assessments, and any annual member, having paid all dues, may become a Life Member by the payment of twenty dollars in addition thereto.

Annual Membership.

Every annual member, before he receives his diploma, or exercises the privileges of a member, shall pay the sum of ten dollars as an admission fee, and shall be subject afterwards to an annual assessment of two dollars.

SECTION XXIII.

Withdrawal or Discontinuance of Membership.

Any member may withdraw from the Society, on giving notice to the Treasurer and paying the amount due from him. Any member who shall neglect for the space of two years to pay his annual assessment, after due notice from the Treasurer, shall cease to be a member. The Treasurer shall give notice of such withdrawals or discontinuances to the Secretary, who shall erase such members' names from the list.

The attention of Annual Members is particularly called to Section XXIII.

HONORARY MEMBERS.

Members and correspondents of the Society and all other persons who may know of deaths, changes of residence, or other circumstances showing that the following list is inaccurate in any particular, will confer a favor by promptly communicating to the Secretary the needed corrections.

Information, or any clew to it, is especially desired in regard to Joseph Maxwell, *elected in* 1830, *and* George W. Smith, *elected in* 1851.

Hon. George S. Boutwell, Groton.
H. W. S. Cleveland, Chicago, Ill.
Hon. Joseph S. Fay, Wood's Holl.
Joseph Jefferson, Buzzard's Bay.
Major L. A. Huguet-Latour, M. P., Montreal, Canada.
Edward Winslow Lincoln, Secretary of the Worcester County Horticultural Society.
Col. Theodore Lyman, Brookline.
Joseph Maxwell, Rio Janeiro, Brazil.
Donald G. Mitchell, New Haven, Conn.
Hon. J. Sterling Morton, Secretary of Agriculture, Washington, D. C.
Baron R. Von Osten Sacken, Heidelberg, Germany.
Samuel B. Parsons, Flushing, N. Y.
Samuel R. Payson, Boston.
George W. Smith, Boston.

CORRESPONDING MEMBERS.

Members and correspondents of the Society and all other persons who may know of deaths, changes of residence, or other circumstances showing that the following list is inaccurate in any particular, will confer a favor by promptly reporting to the Secretary the needed corrections.

Information, or any clew to it, is especially desired in regard to Alexander Burton, *elected in* 1829, S. Reynolds, M. D., 1832, *and* Francis Summerest (or Summerer), 1833.

Édouard André, Editor in Chief of the Revue Horticole, Paris, France.

Professor L. H. Bailey, Cornell University, Ithaca, N. Y.

Charles Baltet, President de la Société Horticole, Vigneronne, et Forestière de l'Aube, Troyes, France.

Napoleon Baumann, Bolwiller, Alsace.

D. W. Beadle, 303 Crawford St., Toronto, Ontario.

Professor William J. Beal, Agricultural College, Michigan.

Prosper J. Berckmans, President of the American Pomological Society, Augusta, Ga.

Charles E. Bessey, Ph.D., Professor of Botany in the Industrial College of the University of Nebraska, Lincoln.

Dr. Ch. Bolle, Berlin, Prussia.

John Croumbie Brown, LL.D., Haddington, Scotland.

Professor J. L. Budd, Secretary of the Iowa Horticultural Society, Ames.

William Bull, Chelsea, England.

Alexander Burton, United States Consul at Cadiz, Spain, Philadelphia.

Isidor Bush, Bushberg, Jefferson Co., Mo.

George W. Campbell, President of the Ohio State Horticultural Society, Delaware, O.

Maxime Cornu, Director of the Jardin des Plantes, Paris, France.

Benjamin E. Cotting, M. D., Boston.

Daniel T. Curtis, Dorchester.

Rev. H. Honywood D'Ombrain, Westwell Vicarage, Ashford, Kent, England.

Robert Douglas, Waukegan, Ill.

Malcolm Dunn, Dalkeith, Scotland.

W. T. Thiselton Dyer, C.M.G., F.R.S., Director of the Royal Botanic Gardens, Kew, England.

Parker Earle, President of the American Horticultural Society, Cobden, Ill.

George Ellwanger, Rochester, N. Y.

Henry John Elwes, F.L.S., F.Z.S., Colesborn, Andoversford, Gloucestershire, England.

William G. Farlow, M. D., Professor of Cryptogamic Botany, Harvard University, Cambridge.

B. E. Fernow, Chief of the Division of Forestry, Department of Agriculture, Washington, D. C.

Andrew S. Fuller, Ridgewood, N. J.

Hon. Robert W. Furnas, Ex-President of the Nebraska State Horticultural Society, Brownville.

Charles A. Goessmann, Ph.D., Director of the State Agricultural Experiment Station, Amherst.

George L. Goodale, M. D., Professor of Botany, Harvard University, Cambridge.

Obadiah B. Hadwen, Ex-President of the Worcester County Horticultural Society, Worcester.

Professor Byron D. Halsted, Botanist and Horticulturist at the New Jersey Agricultural Station, New Brunswick, N. J.

J. H. Hart, Superintendent of the Botanic Garden, Trinidad.

Robert Hogg, LL.D., Editor of the Journal of Horticulture, London.

J. C. Holding, Ex-Treasurer and Secretary of the Cape of Good Hope Agricultural Society, Cape Town, Africa.

Rev. S. Reynolds Hole, Rochester, England.

Sir Joseph Hooker, K.C.S.I., The Camp, Sunningdale, England.

Josiah Hoopes, West Chester, Pa.

George Husmann, Napa, Cal.

William J. Johnson, M.D., Fort Gaines, Ga.

Charles Joly, Vice-President of the Société Nationale d'Horticulture de France, Paris.

Dr. George King, Superintendent of the Royal Botanic Garden, Calcutta.

Professor William R. Lazenby, Secretary of the Agricultural Experiment Station, Columbus, O.

Max Leichtlin, Baden-Baden, Germany.

G. F. B. Leighton, President of the Norfolk Horticultural and Pomological Society, Norfolk, Va.

Victor Lemoine, Nancy, France.

J. Linden, Ghent, Belgium.

T. T. Lyon, President of the Michigan Horticultural Society, South Haven.

Dr. P. MacOwan, Director of the Botanic Garden, Cape Town, Africa.

Dr. Maxwell T. Masters, Editor of the Gardeners' Chronicle, London.

George Maw, Benthal, Kinley, Surrey, England.

T. C. Maxwell, Geneva, N.Y.

Thomas Meehan, Germantown, Pa.

Dr. Charles Mohr, Mobile, Ala.

Dr. Daniel Morris, C.M.G., D.Sc., M.A., F.L.S., Assistant Director of the Royal Botanic Gardens, Kew, England.

Ch. Naudin, Antibes, France.
George Nicholson, Curator of the Royal Botanic Gardens, Kew, England.
William Paul, Waltham Cross, London, N.
Professor D. P. Penhallow, Director of the Botanic Garden, Montreal, Canada.
Henry Probasco, Cincinnati, O.
P. T. Quinn, Newark, N. J.
Cavalière Enrico Ragusa, Palermo, Sicily.
D. Redmond, Ocean Springs, Miss.
S. Reynolds, M. D., Schenectady, N. Y.
William Robinson, Editor of The Garden, London.
Edgar Sanders, Chicago, Ill.
William Saunders, Department of Agriculture, Washington, D. C.
William R. Smith, Curator of the Botanic Garden, Washington, D. C.
Robert W. Starr, Port William, N. S.
Dr. Joseph Stayman, Leavenworth, Kan.
William A. Stiles, Editor of Garden and Forest, Deckertown, N. J.
William Sumner, Pomaria, S. C.
Francis Summerest.
William Trelease, Director of the Missouri Botanic Garden, St. Louis.
Dr. Melchior Treub, Director of the Botanic Garden, Buitenzorg, Java.
H. J. Veitch, Chelsea, England.
Henry L. de Vilmorin, Secretary of the Société Nationale d'Agriculture de France, Paris.
Anthony Waterer, Knap Hill, near Woking, Surrey, England.

ERRATA.

In part I, page 135, line 17, for *rubra* read *Robur*, and in line 19, after *rubra*, insert "or the," so that the sentence shall read *Quercus Robur* is best for most of the oaks, although I believe the red oaks would do better on *Q. rubra* or the var. *tinctoria*.

CONTENTS.

PAGE.

BUSINESS MEETING, April 6. 1895; Memorial of John J. Thomas, pp. 179-181; Annual Report of the Plant Committee read, 181; Appropriation for Committee on Large, Old, or Otherwise Interesting Trees, 181; Amendments to the Constitution and By-Laws taken up, 181; Pillar to mark the spot of the discovery of the original Baldwin apple tree, 181; Four members elected, 181; Honorary Member elected, 182; Corresponding Member elected 182

BUSINESS MEETING, May 4; Three members elected, p. 182, Letter from Mrs. Mary H. Thomas acknowledging the memorial of John J. Thomas, 182; Letter from Prof. Byron D. Halsted acknowledging the receipt of his Diploma, 182; Invitation from W. J. Stewart, President, to the Gardeners' and Florists' Club, May 7 182

BUSINESS MEETING, June 1; Book presented from M. Charles Baltet . . 183

BUSINESS MEETING, July 6; Amendments to Constitution and By-Laws adopted 183

BUSINESS MEETING, August 3; Nominating Committee appointed, p. 183; Three members elected 184

BUSINESS MEETING, September 7; Report of the Nominating Committee, p. 184; Decease of Benjamin P. Cheney announced 184

BUSINESS MEETING, October 5; Annual Election, pp. 185, 187; Memorial to Benjamin P. Cheney, 185, 186; Additional appropriation for Flower Committee, 186; Six members elected, 186; Corresponding Member elected 186

BUSINESS MEETING, November 2; No quorum present 187

BUSINESS MEETING, December 7; Appropriations for Prizes and Gratuities for 1896, p. 187; Appropriation for Lectures and Publications, 188; Partial report of the Committee on Gardens read, 188; Further time granted for the Committee on Gardens, 188; Reports of the Committee on Fruits, Delegate to the State Board of Agriculture, Committee of Arrangements, Committee on Flowers, and Committee on Plants, read, 188; Twelve members elected, 188; Letters from Mrs. Elizabeth S. Cheney and Charles Baltet read 189

BUSINESS MEETING, December 21; No quorum present 189

REPORT OF THE COMMITTEE ON PLANTS; Introduction, pp. 190, 191; Spring Exhibition, 191; May Exhibition, 192; Rose and Strawberry Exhibition, 192, 193; Annual Exhibition, 193; Chrysanthemum Exhibition, 193, 194; Financial Statement, 194; Prizes and Gratuities awarded . 195-203

PAGE.

REPORT OF THE COMMITTEE ON FLOWERS; Introduction, pp. 204, 205; Spring Exhibition, 205, 206; May Exhibition, 206; Rhododendron Show, 206–208; Rose Show, 208–210; Annual Exhibition, 210; Chrysanthemum Show, 211; Financial Statement, 212; Prizes and Gratuities awarded 213-231

REPORT OF THE COMMITTEE ON FRUITS, pp. 232–234; Prizes and Gratuities awarded 235-251

REPORT OF THE COMMITTEE ON VEGETABLES, pp. 252-255; Prizes and Gratuities awarded 256-272

REPORT OF THE COMMITTEE ON GARDENS; Introduction, p. 273; S. C. Pratt's Strawberry Garden, 274; J. W. Manning's Herbaceous Garden, 274-281; Mrs. J. W. Clark's Estate, 281, 282; W. D. Hinds' Peach Orchard, 282–284; Statement of W. D. Hinds, 284, 285; Statement of A. J. Hinds, 285, 286; Forest Hills Cemetery, 286–292; Mrs. B. P. Cheney's Estate, 292,293; W. Nicholson's Chrysanthemum and Carnation Houses, 293–295; Awards 295, 296

REPORT OF THE COMMITTEE OF ARRANGEMENTS, ... 297-299

REPORT OF THE COMMITTEE ON SCHOOL GARDENS AND CHILDREN'S HERBARIUMS; Swan School Garden, Medford, pp. 300–303; George Putnam School Garden, Roxbury, 304–306; Children's Herbariums, 307–309; Prizes and Gratuities awarded 310, 311

REPORT OF THE DELEGATE TO THE MASSACHUSETTS STATE BOARD OF AGRICULTURE 312–316

REPORT TO THE STATE BOARD OF AGRICULTURE 317, 318

REPORT OF THE COMMITTEE ON THE LIBRARY, 319, 320; Note . . . 320

REPORT OF SECRETARY AND LIBRARIAN 321-324

REPORT OF TREASURER 325–330

REPORT OF THE FINANCE COMMITTEE 328

MOUNT AUBURN CEMETERY 331, 332

OFFICERS AND STANDING COMMITTEES FOR 1896 333-335

MEMBERS OF THE SOCIETY; Life, pp. 336–342; Annual, 343–345; Honorary, 347; Corresponding 348–350

EXTRACTS FROM THE CONSTITUTION AND BY-LAWS 346

Experiment Station Reports Wanted.

The Massachusetts Horticultural Society is endeavoring to collect complete sets of the Bulletins and other publications of all the Agricultural Experiment Stations in the United States and Canada. Those named below are wanting, and any person having a spare copy will confer a favor by addressing the Librarian of the Society, Horticultural Hall, No. 101 Tremont Street, Boston.

Alabama (Ag. and Mech. College Station). — Bulletins 4–6 (1884), 7–10 and 1–4 (1885), 5–9 (1886). Seventh Annual Report, for 1894.

Alabama (Canebrake Station). — All Annual Reports later than that for 1890.

Arizona. — Fourth Annual Report, for 1893.

Arkansas. — Bulletin 1. All Annual Reports later than the Fourth, for 1891.

California. — Bulletins 32, 1878, and 1, 2, 3, 5, and 50, new series.

Colorado. — Bulletin 3.

Connecticut (New Haven Station). — Bulletins 1 to 67, inclusive. Annual Reports for 1877 to 1883, inclusive, except that for 1878.

Delaware. — All Annual Reports later than the Fifth, for 1892.

Idaho. — All Bulletins later than No. 9.

Indiana (Purdue Univ. School of Ag.). — Bulletin 1. College Reports 1 to 14, inclusive.

Kentucky. — Bulletin 10.

Maryland. — Special Bulletins G and K.

Missouri. — Bulletins 9, 13, 15, 16, 19, 20, 25, 26, and 33 of the Old Series. All Annual Reports since the First, for 1888.

New Hampshire. — 3d and 4th Annual Reports.

New Jersey. — Bulletins 1, 4, 5, 15, 27, and 28.

New York (Cornell). — Annual Report, 1882–83 (Report of Agricultural Department of Cornell University).

North Carolina. — Bulletins 1 to 56, inclusive, and 69, 2d ed. Meteorological Division, Bulletin 2 (68*b*), and 2d and 3d Annual Reports, for 1888 and 1889. Special Bulletins 1 (77*a*) and 4 (82*a*). Weekly Weather Crop Bulletins 1–21, 1888; 1–24, 1889; 1–25, 1890; 2 and 4, 1891.

North Dakota. — All Annual Reports later than the Third, for 1892.

Ohio. — All Bulletins of the First Series, except 16, 17, 18, and 19.

Oregon. — All Annual Reports later than the Third for 1890–91.

Pennsylvania. — Annual Reports for 1869, 1872, 1879–80, 1881, 1882, 1883 and 1884. [All issued by the State College.]

South Carolina. — All Bulletins of the Old Series (previous to 1888) on the work of the Experimental Farm of the South Carolina College. Third Annual Report, for 1890, and Sixth Annual Report, for 1893.

Texas. — College Bulletins 1–5, 1883–1887.

Virginia. — Bulletins 53–60, inclusive.

Washington. — Fourth Annual Report, for 1893–94.

West Virginia. — Special Bulletin, — Potash and Paying Crops, 1890. All Annual Reports later than the Third, for 1890.

Ontario Department of Agriculture, Toronto. Bureau of Industries. — Agricultural Returns to the Ontario Bureau of Industries, Nov., 1882 (5th), Aug., 1883 (7th), and Nov., 1887 (20th).

TRANSACTIONS

OF THE

Massachusetts Horticultural Society,

FOR THE YEAR 1895.

PART III,

BEING THE LIST OF

ACCESSIONS TO THE LIBRARY

DURING THE YEAR.

BOSTON:
PRINTED FOR THE SOCIETY.
1897.

☞ See last page of cover; also list of Books Wanted, pp. 415–421.

TRANSACTIONS

OF THE

Massachusetts Horticultural Society,

FOR THE YEAR 1895.

PART III,

BEING THE LIST OF

ACCESSIONS TO THE LIBRARY

DURING THE YEAR.

BOSTON:
PRINTED FOR THE SOCIETY.
1897.

In accordance with the directions of the Committee on Lectures and Publication this list of Library Accessions is published in a separate pamphlet as Part III of the TRANSACTIONS for 1895.

Library Accessions, 1895.

In the following list the books purchased from the income of the Stickney Fund are marked S. F.; and those purchased from the Society's Appropriation for the Library, L. A. All others were received by donation and exchange, and the source whence received is given in every instance when known.

The measurements of the books are in inches and tenths of an inch, giving first the height, next the thickness, and lastly the width. When a pamphlet is less than one-tenth of an inch in thickness the place of that dimension is supplied by a dash.

GENERAL HORTICULTURE.

Amherst, The Hon. Alicia. A History of Gardening in England. Olive-green cloth, 10.2×1.4×7.1, pp. xvi, 398; 65 cuts. London: 1895. S. F.

Baltet, Charles. L'Horticulture dans les Cinq Parties du Monde. Half brown morocco, 10.×2.2×6.9, pp. xviii, (1), 776. Paris et Troyes: 1895. The Author.

Bon Jardinier Almanach, Le, pour l'année 1857, etc. Par Vilmorin, Poiteau, Louis Vilmorin, Decaisne, Naudin, Neumann et Pepin. Half calf, 6.8×2.8×5., pp. lxiv, 1568. Paris: n. d. Ulrich Holzer.

Garden Oracle and Floricultural Year Book, The. 1895. By the editor of "The Gardeners' Magazine." 37th year of publication. Half red cloth, 7.3×.7×5., pp. 274; 2 colored plates, cuts. London: (1895). S. F.

Horticultural Directory and Year Book for 1895. 36th year of publication. Blue paper, 7.×.9×4.8, pp. 496. London: (1895). S. F.

Clark, John T. C. The Amateurs' Guide and Flower-Garden Directory; . . . . to which is added the Vegetable Garden Manual. Faded plum-colored cloth, 8.2×.5×5.5, pp. 158; 15 cuts. Washington, D. C.: 1856. S. F.

(**Lucas,** Fielding, Jr.) The Practical American Gardener; etc. For every month in the year. By an Old Gardener. Full calf, 5.8×1.2×3.7, pp. xii, 424. Baltimore: 1819. S. F.

Miller, Philip, F. R. S. The Gardeners' Calendar; Directing what Works are necessary to be done every month in the Kitchen, Fruit, and Pleasure-Gardens, as also in the Conservatory and Nursery. Etc. Full calf, 7.9×1.3×5., pp. xviii, 352, (11); frontispiece. London: 1757. S. F.

Hanbury, Rev. William, A. M. A Complete Body of Planting and Gardening, etc., etc. 2 vols. Half Russia, 17.3×2.7×10.9. (I.) pp. iv, xx, 885; frontispiece and 12 plates. London: 1770. (II.) pp. 832, (24); frontispiece and 8 plates. London: 1771. S. F.

McIntosh, Charles, C. M. C. H. S. Flora and Pomona; or, The British Fruit and Flower Garden; containing descriptions of the most valuable and interesting Flowers and Fruits, cultivated in the Gardens of Great Britain, with figures drawn and colored from Nature. Etc. Boards, light-brown cloth back, 8.8×1.2×5.7; 71 colored plates (flowers 1–27, xxviii–xxxv and fruits i–xxxvi) with descriptive text and directions for painting. London: 1829. S. F.

Johnson, George W. The Principles of Practical Gardening. Brown cloth, 7.×.9×4.5, pp. (8), 343; cuts. London: 1845. S. F.

——— ——— —. The Gardener. Complete in twelve parts, forming three volumes. *Vol. I.* The Potato, Cucumber, Gooseberry, and the Grape Vine. pp. iv, 181, iv, 180, iv, 163, iv, 151; 1 colored plate, cuts. London: 1849. *Vol. II.* The Auricula, Asparagus, Pineapple, and the Strawberry. pp. iv, 184, 133, 133, iv, 126; cuts. London: 1849. *Vol. III.* The Dahlia, Peach, and the Apple. pp. 111, 189, 149, iv, 130; cuts. London: 1849. 3 vols., green cloth, 6.8×1.6×4.3. S. F.

——— ——— —., *Editor.* The Cottage Gardeners' Dictionary. Describing the Plants, Fruits, and Vegetables desirable for the Garden, and explaining the terms and operations employed in their cultivation. Faded green cloth, 8.×2.1×5.1, pp. iv, 927; cuts. London: 1852. S. F.

Sutton and Sons, (Reading). The Culture of Vegetables and Flowers from Seeds and Roots. Also a year's work in the vegetable garden, flowers all the year round, the rotation and chemistry of crops, the formation of lawns from seed, and descriptions of and remedies for garden pests. Sixth Edition. Blue cloth, 8.8×1.4×5.8, pp. (1), 425; cuts. London: 1895. S. F.

Mottet, S. Guide élémentaire de Multiplication des Végétaux. Étude des différents moyens d'effectuer les semis, boutures, marcottes, greffes et divisions. (Bibliothèque d'Horticulture et de Jardinage.) Tan-colored cloth, 7.1×.5×4.6, pp. iii, 195; 85 cuts. Paris: 1895. S. F.

Horticultural and Agricultural Repository: containing important discoveries and improvements in Farming, Gardening, etc., etc. Faded-green cloth, 8.7×1.×5.4, pp. (9), 301. Lewes: n. d. S. F.

Lelong, B. M. Propagation. The Rearing of Citrus and Deciduous Trees from Seed. Budding, Grafting, and Appliances. Pamphlet, gray, 9.×.1×6., pp. 38; cuts, table. Sacramento: 1892. The Author.

Practical Gardening: being a series of Essays delivered by members and friends of the Devon and Exeter Gardeners' Mutual Improvement Association, during the Session 1891–2. Boards, light brown, blue

cloth back, 8.2×.2×5.5, pp. (4), 86. Exeter: [1893] Robert Veitch & Son.

Hayward, Joseph. An Inquiry into the Causes of the Fruitfulness and Barrenness of Plants and Trees. Arranged as a Dialogue. Dark green cloth, 7.×1.×4.5, pp. vi, (2), 292; cuts. London: 1834. S. F.

Williamson, William. The Horticultural Handbook and Exhibitors' Guide. A Treatise on cultivating, exhibiting, and judging plants, flowers, fruits and vegetables. Revised by Malcolm Dunn. New edition, enlarged. Light green cloth, 7.4×.9×5.2, pp. xxi, 248. Edinburgh and London: 1895. S. F.

Thompson, Colonel Halford, R. A., F. R. H. S. Plants without Earth, and How to Grow them in Jadoo Fibre. A Lecture given at People's Palace for East London. Pamphlet, 8.4×—×5.6, pp. 32; 2 cuts. London: 1895. L. A.

Wright, J., F. R. H. S. (Primer of) Horticulture. Ten lectures delivered for the Surrey County Council. Red cloth, 6.×.4×3.9, pp. 154; 37 cuts. London: 1893. S. F.

Gardener, The. A Magazine of Horticulture and Floriculture. (Vols. 1–16.) 1867-1882. Edited by William Thompson, Richard Dean and David Thompson. 16 vols., green cloth, 8.8×1.3-2.5×5.8, plates, cuts. Edinburgh and London: 1868–1882. L. A.

Rural Magazine, and Literary Evening Fire-side, The. Vol. 1, 1820. Half red leather, 8.8×1.5×5.8, pp. (4), 430. Philadelphia: 1820. [Only one volume published.] S. F.

Semi-Tropical California and Southern California Horticulturist. Vol. 5, No. 3. Los Angeles, Cal., March, 1882. Pamphlet, yellow, 11.7×—×9.2, pp. 265–280. C. R. Orcutt.

Semi-Tropical Planter, The. A Monthly Journal for the Farm, Garden and Fireside. *Vol. I, Nos. 1–8.* May to December, 1887. pp. 104; cuts. *Vol. II, No. 1.* January, 1888. pp. 20. *Vol. III, No. 1.* November, 1888. pp. 8. 9 pamphlets, blue, 12.1×—×9.3. C. R. Orcutt.

Horticulturist, The. No. 3. March, 1890. An Illustrated Monthly Journal of Literature, Science and Horticulture for the Rural Homes of Southern California. San Marcos, San Diego County, California. Pamphlet, tea, 10.8×—×7., pp. 8.

Great South-west, The. Vol. I, Nos. 1–7; Vol. II, Nos. 1–4 and 6–12; Vol. III, Nos. 1–3, and 5–12; Vol. IV, Nos. 1–5; Vol. V, Nos. 3 and 5–7. 38 pamphlets, 13.6×—×10.3. April, 1889 to July, 1893 C. R. Orcutt.

San Diego Magazine: California. New Series. Vol. I, Nos. 1–3. March-May, 1888. 3 pamphlets, yellow, 12.1×—×9.4, pp. 48. C. R. Orcutt.

Out of Doors for Women. Vol. II, Nos. 20 and 21. July and August, 1895. 2 pamphlets, 8.9×—×6., pp. 15, 16. Orcutt, Cal., and San Diego, Cal.: (1895). C. R. Orcutt.

Herendeen Manufacturing Co., Geneva, N.Y. Faultless Furman Boilers. Catalogue, etc. 19th edition. Pamphlet, buff, 7.1×.2×5.2, pp. 128; cuts.

Modern Greenhouse Heating. Steam and Hot Water Boilers, etc. 18th edition. Pamphlet, buff, 7.4×.1×5.4, pp. 46; cuts.

Home Warming and Ventilation. Etc. 4th edition. Pamphlet, blue, 7.2×.1×5.2, pp. 64; cuts. The Publishers.

Hitchings & Co., *Publishers.* Modern Greenhouse Construction. Pamphlet, green, 7.2×.2×9.8, pp. 64; cuts. The Publishers.

Greenhouse Heating and Ventilating Apparatus. (2d edition). Pamphlet, dark red, 9.7×.2×7., pp. 68; cuts. The Publishers.

Jones, Walter. Heating by Hot Water, (second edition), with information and suggestions on the best methods of heating public, private and horticultural buildings. Etc., etc. Maroon cloth, 7.5×.9×5.2, pp. 220; 96 cuts. London: 1894. S. F.

Beecher, Henry Ward. Plain and Pleasant Talk about Fruits, Flowers, and Farming. Black cloth, 7.5×1.4×5.4, pp. i-viii, 9-420. New York: 1859. S. F.

Johns, Rev. C. A., B. A., F. L. S., *Editor.* Gardening for Children. Seventh Thousand. Green cloth, 5.4×.5×4.5, pp. viii, 182, (2); frontispiece, cuts. London: [1849?] S. F.

Chamberlain, Mrs. T. (Edith L.), F. R. H. S. Town and Home Gardening. Gray cloth, 7.5×.8×5., pp. vi, (1), 160. London: 1893. S. F.

Robbins, Mary Caroline. The Rescue of an Old Place. Dark gray cloth, 7.2×1.1×5., pp. viii, 289. Boston and New York: 1892. Waldo O. Ross.

Ellwanger, George H. The Garden's Story or Pleasures and Trials of an Amateur Gardener. Half blue morocco, 6.5×.9×4.4, pp. vii, (1), 345; cuts. New York: 1889. S. F.

Also the second edition, light-green cloth, from Waldo O. Ross.

Thaxter, Celia. An Island Garden. With pictures and illuminations by Childe Hassam. Light-green linen, 9.3×1.×6.7, pp. ix, 126; frontispiece, 11 plates, etc. Boston and New York: 1895. S. F.

Cooper, Miss (Susan Fenimore). The Rhyme and Reason of Country Life: or, Selections from Fields Old and New. By the author of "Rural Hours," etc., etc. Plum-colored cloth, 7.6×1.3×5.4, pp. i-xii, 13-428; 17 plates, cuts. New York: 1855. S. F.

Ellacombe, Henry N., M.A., etc. In a Gloucestershire Garden. Dull red linen, 7.7×1.4×5.4, pp. (8), 302; 4 plates, 12 designs. London: 1895. S. F.

Austin, Alfred. The Garden that I Love. 3rd edition. Green linen, 8.3 ×1.×5.6, pp. vi, 168; cuts. London and New York: 1895. S. F.

"G. S. C." Gardens of Light and Shade. Green cloth, 10.×.7×7.6, pp. viii, (1), 70; 6 photographs, 1 plan, cuts. London: 1886. S. F.

Dyer, T. F. Thiselton. The Folk-Lore of Plants. Blue cloth, 7.7×3.3× 5.2, pp. (3), 328. London: 1889. Waldo O. Ross.

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Newport Horticultural Society. Chrysanthemum Exhibition and Floral Show, to be held at Newport, Rhode Island, October 30 and 31, and November 1, 1895. Sixth Annual Exhibition. Schedule of Premiums. Pamphlet, 9.×—×5.9, pp. (4). The Society.

New York Horticultural Society. Address read at the Anniversary Celebration, of the 28th of August, 1827. By H. N. Carter. Pamphlet, dark tea, 8.4×.1×5.4, pp. 22. New York: 1827. L. A.

Brooklyn Tree Planting and Fountain Society. Circulars 1–10. February 1894—November, 1895. 10 circulars, 11.×8.5.

Bulletin No. 1. Second Edition. July, 1894. Pamphlet, light blue, 9.×.3×5.7. pp. 63. Brooklyn: 1894.

Bulletin No. 2. Second Edition. February, 1895. Pamphlet, light blue, 8.9×.2×5.7, pp. 44; cuts. Brooklyn: 1895.

Diagram of Streets, with a list of trees suitable for planting in the streets of Brooklyn. 1 sheet, 10.×20.8.

Letter of L. Collins, Secretary, to B. E. Fernow, Chief, Division of Forestry, Washington, D. C., and reply, containing rated list of street trees for planting in Brooklyn. Circular, 10.9×8.5, pp. (3). Lewis Collins, Secretary.

Western New York Horticultural Society. Proceedings of the Fortieth Annual Meeting, held at Rochester, N. Y., January 23 and 24, 1895. Pamphlet, terra-cotta, 8.7×.2×5.9, pp. 174; 2 portraits, cuts. Rochester, N. Y.: 1895. John Hall, Secretary.

New Jersey State Horticultural Society. Proceedings at its Twentieth Annual Session, held at Trenton, N. J., January 2d and 3d, 1895. Pamphlet, gray, 8.8×.4×5.9, pp. 191; portrait, 1 plate. Mount Holly, N. J.: 1895. Henry I. Budd, Secretary.

Pennsylvania Horticultural Society. A Brief History. From its Organization, November 24, 1827, to July, 1895. Pamphlet, light blue, 7.5×—×5.4, pp. 10. D. D. L. Farson, Secretary.

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Pennsylvania State Horticultural Association. Report for 1894. Pamphlet, tea, 9.2×.2×6.1, pp. 104; 1 colored plate, 2 charts. n. p.: 1895. E. B. Engle, Recording Secretary.

West Virginia State Horticultural Society. Report of First Meeting and Organization. [Contained in duplicate copy of Bulletin No. 3,

Vol. 4 (or Special Bulletin No. 2) of the West Virginia Experiment Station.] Pamphlet, terra-cotta, 9.1×.2×5.9, pp. 74–111 (Horticultural Report). Charleston: 1895. Prof. F. William Rane, Secretary.

North Carolina State Horticultural Society. Fourteenth Annual Report. 1894. By Gerald McCarthy, Secretary. Pamphlet, pink, 9.×.1×5.8, pp. 37. Raleigh: 1895. The Secretary.

Georgia State Horticultural Society. Proceedings of the Nineteenth Annual Meeting, held in the City of Cuthbert, July 31 and August 1 and 2, 1895. Pamphlet; light green, 8.9×.2×5.7, pp. 103; cuts. Augusta: 1895. George H. Miller, Secretary.

New Orleans Horticultural Society. Second Grand Chrysanthemum Show, for the benefit of the Anti-Toxin Fund, etc. November 14–17, 1895. Pamphlet, 11.8×—×9.3, pp. (12).

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Texas State Horticultural Society. Premium List offered by the citizens of Bowie, Texas, with Programme for the Ninth Annual Meeting and Fair to be held at Bowie, Texas, July 31st and August 1st and 2nd, 1895. Pamphlet, light brown, 8.5×—×5.8, pp. 15. Fort Worth, Texas: 1895. E. L. Huffman, Secretary.

Ohio State Horticultural Society. Twenty-eighth Annual Report, for the year 1894–5. Pamphlet, gray, 9.4×.5×6.7, pp. 322; 2 plates, cuts. Columbus, Ohio: 1895. W. W. Farnsworth, Secretary.

Columbus (Ohio) Horticultural Society. Annual Report. For the year ending December 31, 1894. Containing Constitution, List of Members and Quarterly Journal. Vol. 9. Prepared by Aug. D. Selby, Secretary. Dark-green cloth, 9.×.7×6., pp. viii, 180, (3); 7 plates, cuts. Columbus, O.: 1895. The Secretary.

Indiana Horticultural Society. Transactions for the year 1894, being a report of the Thirty-fourth Annual Meeting, held in the City of Indianapolis, November 7–9, 1894. Together with Reports of the Summer Meeting, held in New Amsterdam, August 22 and 23, and of Local Societies, Selected Papers, etc. By William H. Ragan, Secretary. Black cloth, 9.1×.5×6., pp. 173. Indianapolis: 1895. The Secretary.

Missouri State Horticultural Society. Thirty-seventh Annual Report. Meetings at Harrisonville, June 5, 6, 7, and Trenton, December 4, 5, 6, 1894. Dark-green cloth, 9.3×1.×6.1, pp. 393, v. iii; frontispiece, 3 plates. Jefferson City, Mo.: 1895. L. A. Goodman, Secretary.

Chicago Horticultural Society. Revised List of Premiums. To be awarded at the Annual Fall Exhibition, November 5 to 9, inclusive, 1895. Pamphlet, 8.6×—×5.8, pp. (9). Edgar Sanders, Chicago.

Chicago Horticultural Society. Programme and Revised Premium List for the Annual Fall Exhibition, November 5–9, 1895. Pamphlet, 8.5×—×5.7, pp. (22). Edgar Sanders.

Minnesota State Horticultural Society. Annual Report, 1894. Vol. XXII. Embracing the Transactions of the Society from January 13, 1893, to January 8, 1895, including the Twelve Numbers of "The Minnesota Horticulturist" for 1894. Edited by the Secretary, A. W. Latham. Black cloth, 9.3×1.3×7.4, pp. (4), 538, portrait, plates, cuts. Minneapolis: 1894. A. W. Latham, Secretary.

Colorado State Board of Horticulture. Semi-Annual Reports for the years 1893–1894. Vol. VII. Black cloth, 9.3×1.2×6.2, pp. 445; frontispiece, 1 portrait. Denver: 1894. The State Board of Horticulture.

California, State of. Annual Report of the State Board of Horticulture for 1892. Pamphlet, blue, 9.×.8×5.9, pp. (4), 463; 2 maps. Sacramento: 1892. B. M. Lelong, Secretary.

California State Board of Horticulture. Division of Entomology. Destructive Insects, Their Natural Enemies, Remedies and Recommendations. By Alexander Craw. Pamphlet, blue, 9.×.1×5.9, pp. 51; 1 colored and 2 plain plates, 62 cuts. Sacramento: 1891. B. M. Lelong, Secretary, State Board of Horticulture.

London, Horticultural Society of. Proceedings. From May, 1838, to December, 1843. Half green morocco, 9.5×1.1×6.3, pp. 442; cuts. London: 1844. S. F.

Royal Horticultural Society. Proceedings. Vols. 1–6 (covering the period from June 1, 1859 to January, 1869). 6 vols., half green morocco, 8.9–10.2×.6–1.8×6.5. London: 1861–(1869). S. F.

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Vol. XVII, Parts 3 and 4. April, 1895. pp. 71–140, cxliii–cclxx; cuts 20–34.

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4 pamphlets, gray, 8.4×.6×5.5. London: 1895. The Secretary.

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France, Société nationale d'Horticulture de. Journal, 3e série. Tome XVII, 1895. 12 pamphlets, gray paper, 8.5×.2×5.5, pp. 903. Paris: 1895.

[Also] Liste générale des Membres de la Société, Arrêtée au 1er Mars, 1894. (Supp. Jour. Soc. Nat. d'Hort. de France, Numéro d'Avril, 1895.) Pamphlet, green, 8.5×.3×5.4, pp. 157, (2). Paris: (1895). The Society.

Seine-Inférieure, Société Centrale d'Horticulture de la. Bulletin. Tome XXXVI.—3e et 4e cahiers de 1894; Tome XXXVII.—1er et 2e cahiers de 1895. 4 pamphlets, lilac-color, 9.×.1×5.6, pp. 155–304; 1–128. Rouen: 1894, 1895. The Society.

Catalogue des Fruits Moulés de table, faisant partie des collections de la Société. (Supplément du 3e bulletin de 1894.) Pamphlet, gray, 8.3×.2×5.3, pp. vi, 76. Rouen: 1894. The Society.

Sarthe, Société d'Horticulture de la. Bulletin. Tome XII.—1893, 4e trimestre; 1895, 1er trimestre. 2 pamphlets, salmon-color, 8.7×—×5.6, pp. 513–576. (Le Mans:) 1894, 1895. The Society.

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Société d'horticulture d'Orléans et du Loiret. Bulletin. 3e Série. Tome I. 1889 and 1890. 8 numbers. 6 pamphlets, blue, 9.8×.1–.5×6.5, pp. 470; 2 plates, cuts, etc. Orléans: 1889, 1890.

Tome II. 1891–1893. 12 numbers. Pamphlets, blue, 9.8×.1×6.4, pp. 544. Orléans: 1891–1893.

Tome III. Nos. 2–4. 1894. 3 numbers. 2 pamphlets, blue, 9.8×.2×6.4, pp. 37–184. Orléans: 1894.

Extrait du Bulletin de la. Concours régional agricole tenu a Orléans en Mai, 1876. Étude retrospective et rapports officiels sur la 42e exposition florale de la société et le 1er concours général de l'industrie horticole, par M. Eugène Delaire et M. Noel Bretagne. Pamphlet, gray, 9.8×.3×6.5, pp. (11), 325–519, (2); cuts. Orléans: 1876. Eugène Delaire, Secrétaire-général.

Bulletin d'arboriculture, de floriculture et de culture potagère rédigé par Fr. Burvenich, Éd. Pynaert, Ém. Rodigas et Hub. Van Hulle. Organe du Cercle d'Arboriculture de Belgique. 6me Série, Vol. IV., 1895. 12 numbers. Pamphlets, gray, 9.2×.1×5.9, pp. 384; colored plates, cuts. Gand: 1895, The Editors.

Exposition Universelle de l'Hôtel et du Voyageur à Amsterdam, 1895. Section XIV.— Horticulture. Pamphlet, green, 8.3×—×5.4, pp. 8.

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Gartenflora. Zeitschrift für Garten- und Blumenkunde. (Begründet von Eduard Regel.) 43 Jahrgang. Organ des Vereins zur Beförderung des Gartenbaues in den preussischen Staaten. Herausgegeben von Dr. L. Wittmack. 24 numbers. Half calf, 10.3×1.7×7.3, pp. 672; 12 colored plates (1398–1409), 111 cuts. Berlin: 1894. Dr. L. Wittmack, Secretary of the Berlin Horticultural Society.

Genève, Société d'Horticulture de. Bulletin. 40me Année. 1895. 12 pamphlets, pink, 9.5×—×6.2, pp. 192; cuts. Geneve: 1895. The Society.

R. Societa Toscana di Orticultura. Bullettino. Anno XX. 1895. (Vol. X della 2.a Serie.) 12 pamphlets, cream-color, 10.6×.1×7.2, pp.

376, and Index, 1886–95, pp. 57; 12 plates, colored and plain, 34 cuts. Firenze: 1895. The Society.

Japanese Horticultural Society. Journal. Nos. 59–66. October, 1894 to October, 1895. 8 pamphlets, tea, 9.8×.1×6.7. (Tokyo: 1894, 1895.) S. Yoshida.

FLOWERS AND ORNAMENTAL PLANTS.

Flower-Garden Display'd, The, In above Four Hundred Curious Representations of the most beautiful flowers; Regularly dispos'd in the respective months of their Blossom, etc., etc. The Second edition. To which is Added A Flower-Garden for Gentlemen and Ladies; etc., etc. Also The Method of raising Salleting, Cucumbers, Melons, etc., at any Time in the Year. As it is now practised by Sir Thomas More. Black leather, 9.9×1.×7.5, pp. (6), 139; 11 colored plates and colored title-page. London: 1734. S. F.

Doyle, Martin. The Flower-Garden, or monthly calendar of practical directions for the culture of flowers. First American Edition. Adapted to the climate of the United States, with notes and observations by L. D. Gale, M. D., etc. Faded pink cloth, 7.3×.7×5.8, pp. 180; 3 colored plates, 1 cut. New York: 1835. S. F.

Breck, Joseph. The Flower-Garden; or Breck's Book of Flowers; in which are described all the various hardy herbaceous perennials, annuals, shrubby plants, and evergreen trees, desirable for ornamental purposes, with directions for their cultivation. New edition, revised and enlarged. Black cloth, 7.7×1.3×5.4, pp. i–xii, 13–395. New York: 1858. S. F.

Bridgeman, T. The Florists' Guide, containing practical directions for the cultivation of annual, biennial and perennial flowering plants, of different classes, herbaceous and shrubby, bulbous, fibrous and tuberous-rooted; including the Double Dahlia; with a Monthly Calendar, containing instructions for the management of greenhouse plants throughout the year. Third Edition, enlarged and improved. Boards, yellow, faded green cloth back, 7.1×.5×4.6, pp. i–viii, 9–180. New York: 1840. S. F.

Also, a new and improved edition. Brown cloth, 7.7×.7×4.7, pp. 175; portrait. New York: 1895. S. F.

Casey, J. P. A Treatise on the Culture and Growth of different sorts of Flower Roots, and of Greenhouse Plants kept in rooms, etc. To which is added, a Table of the Linnean Classes of Botany, with their Orders and Examples. Full calf, 5.6×.3×3.6, pp. 99, (2). Baltimore: 1821. S. F.

Rose, N. Jönsson-. Window and Parlor Gardening. A Guide for the Selection, Propagation and Care of House-Plants. With illustrations by the Author. Light-green linen, 7.8×.6×5.4, pp. xi, 164; IV plates, cuts. New York: 1895. S. F.

Parsons, Samuel, Jr. Bedding Plants. [From Scribner's Magazine, March, 1895. pp. 329–337; 7 cuts.] J. D. W. French.

Stackhouse, S. Hardy Plants for Little Front Gardens. Boards, pale pink, 6.5×.5×4.2, pp. viii, 120. London: [1885?] S. F.

Correvon, Henry. Les Plantes Alpines et de Rocailles. Description — Culture — Acclimatation. (Bibliothèque d'Horticulture et de Jardinage.) Tan-colored cloth, 7.1×.6×4.5, pp. ii, 237, (2); 19 cuts. Paris: 1895. S. F.

Guihéneuf, D. Les Plantes Bulbeuses, Tuberculeuses et Rhizomateuses Ornementales de Serre et de Pleine Terre. Half green morocco, 7.8×1.6×4.9, pp. iv, 686 (2); 227 cuts. Paris: 1895. S. F.

D'Ombrain, Rev. H. Honywood, *Editor*. The Rosarian's Year-Book for 1895. Boards, gray, 7.×.3×5.4, pp. (7), 63; 1 portrait. London: 1895. S. F.

Melliar, Rev. A. Foster-, M. A. The Book of the Rose. Red linen, 8.×1.4×5.7, pp. xii, 236; frontispiece and 28 plates. London and New York: 1894. S. F.

Hibberd, Shirley. The Amateur's Rose Book, etc., etc. A New Edition revised by George Gordon. Olive-green cloth, 7.4×1.1×5.3, pp. (7), 294, (4); colored frontispiece, cuts. London: 1894. S. F.

Burnside, F. R. Tea Roses and How to Grow and Exhibit them. Brief Practical Hints for Beginners. Flexible covers, white, 5.9×.1×4.8, pp. 23. Hereford and London: 1893. S. F.

Christ, Dr. H. Le Genre Rosa. Résultats généraux des travaux de botanique systématique concernant ce genre. Traduit de l'allemand du Botanisches Centralblatt, 1884, Nos. 23, 26. Par Émile Burnat. Red cloth, 9.5×.4×6.4, pp. 56. Genève, Bale et Lyon: 1885. L.A.

Singer, Max. Dictionnaire des Roses, ou Guide général du Rosiériste. 2 vols. (A–L and M–Z.) Half wine-colored morocco, 7.2×1.5×5., pp. (2), 439; 364, 11, 10; 23 plates. Tournai: 1885. S. F.

Roses et Rosiers par des horticulteurs et des amateurs de jardinage. Half blue morocco, 10.6×1.7×7.5, pp. 311; 48 colored plates, 61 cuts. Paris: n. d. S. F.

Veitch, James & Sons. A Manual of Orchidaceous Plants cultivated under glass in Great Britain. *Part IX.* Cymbidium, Zygopetalum, Lycaste, etc., etc. pp. 194; (6) plates, cuts. London: 1893. *Part X.* General Review of the Orchidaceæ. pp. viii, 9–160, iv, xii; (4) plates, 2 maps, cuts. London: 1894.
2 parts, gray paper, 10.×.6×6.1. S. F.

Warner, Robert, F.L.S., F.R.H.S., and Henry Williams, F.L.S., F.R.H.S. The Orchid Album, comprising figures and descriptions of new, rare, and beautiful Orchidaceous Plants. Vol. XI, parts 126–128. 3 parts, straw-colored paper, 12.5×.1×10., colored plates 501–512, and descriptive text. London: (1895?) S. F.

Sander, F. Reichenbachia.— Orchids illustrated and described. Second series. Vol. 2, part 12. pp. 107–114; plates 93–96. London: 1895? [Completion of the work.] Half green morocco, 21.6×2.×17.6 (the whole volume). S. F.

Linden, J., Lucien Linden and Em. Rodigas. Lindenia.— Iconography of Orchids. [English Edition.] *Vol. 8*, parts 46–48. August, 1894 to

January, 1895. pp. 29–53; colored plates 445–456. Brussels: 1894–5. *Vol. 9*, parts 49 and 50. February and March, 1895. pp. 1–20; colored plates 457–464. Brussels: 1895. Half green morocco, 14.2×1.4×11.4. S. F.

Bohnhof, E. Dictionary of Orchid-Hybrids, containing a list of all artificial and natural hybrids known up to the 1st of January, 1895, the name of their raiser or introducer, the date of their appearance. Etc., etc. Red cloth, 7.2×.5×4.7, pp. (12), 139. Paris: 1895. S. F. [Title pages in French, English, and German].

Kerchove de Denterghem, Le Comte O. de. Le Livre des Orchidées. Half wine-colored morocco, 10.4×2.3×7.5, pp. viii, 601; 31 colored plates, 310 cuts. Gand et Paris: 1894. S. F.

Linden, Lucien, A. Cogniaux, et G. Grignan. Les Orchidées Exotiques et leur Culture en Europe. Half wine-colored morocco, 10.7×2.1 ×7.6, pp. xiv, 1019; portrait, 141 cuts. Bruxelles et Paris: 1894. S. F.

Plauchut, Edmond. Les Orchidées. Pamphlet, manilla, 9.7×—×6.2, pp. 432–456. [*From* Revue des Deux Mondes. 15 Janvier, 1895.] L. A.

Marquess of Lothian. The Genus Masdevallia. Issued by the Marquess of Lothian, K. T., chiefly from plants in his collection of Orchids at Newbattle Abbey; plates and descriptions by Miss Florence H. Woolward; with engravings from photographs. Additional notes by Consul F. C. Lehmann (German Consul in the Republic of Colombia.) Parts VI and VII. Half maroon morocco, 18.3×2.1× 13.4, 10 colored plates in each part, with descriptive text. London: 1894, 1895. S. F.

Measures, R. I. Cypripediums. [A List.] Third Edition. November, 1894. Blue calf, 2.7×.3×4.5, pp. 63, interleaved with blank leaves. S. F.

Dobbie & Son, *Publishers.* Violas and Viola Culture. Pamphlet, 4.8× —×3., pp. 15. Rothesay: 1893. L. A.

Viola Conference held at the Botanical Gardens, Edgbaston, Birmingham, on the 3rd August, 1894. Report of Proceedings. Pamphlet, 8.5×—×5.5, pp. 20; 2 plates. L. A.

Barker, Michael, Horticultural Department Cornell University, *Editor.* The American Chrysanthemum Annual. 1895. Boards, green, 9.9×.3×7.5, pp. (5), 44; frontispiece, 7 plates, 2 pages of portraits, cuts. Floral Park, N. Y.: (1895). S. F.

Jones, H. J. A Descriptive Catalogue of Chrysanthemums. Olive-green cloth, 8.6×.4×5.6, pp. 110; 13 plates. S. F.

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Edwards, F. C. Cyclamen and How to Grow Them. Second Edition. Maroon cloth, 7.3×.2×5., pp. 31. Manchester: 1894. S. F.

Sayers, E. A Treatise on the Culture of the Dahlia and Cactus. Boards, yellow, green-cloth back, 6.2×.3×3.7, pp. i–vi, 7–72. Boston: 1839. S. F.

Duval, Léon. Les Azalées: — Historique — Multiplication — Culture — Forçage — Emplois, etc. (Bibliothèque d'Horticulture et de Jardinage.) Tan-colored cloth, 7.×.5×4.5, pp. iii, 111, (1); 24 cuts. Paris: 1895. S. F.

McDonald, Donald. Sweet-Scented Flowers and Fragrant Leaves. Interesting associations gathered from many sources with notes on their history and utility. With introduction by W. Robinson. Green cloth, 7.4×1.×5.2, pp. lii, 136; 16 colored plates. New York: 1895. S. F.

Piesse, G. W. Septimus. The Art of Perfumery, and the methods of obtaining the Odours of Plants; . . . . to which is added an appendix on preparing artificial Fruit Essences, etc. Second edition. Blue cloth, 7.5×1.2×4.8, pp. xvi, 352; 2 plates, cuts. London: 1856. S. F.

Mathews, F. Schuyler. Familiar Flowers of Field and Garden. Sage-green cloth, 7.6×1.×5.2, pp. vii, 308; frontispiece, cuts. New York: 1895. S. F.

Watson, Forbes. Flowers and Gardens. Notes on Plant Beauty. By a medical man. Green cloth, 7.3×1.×5.2, pp. ix, 258. London: 1872. S. F.

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American Carnation Society. Proceedings of the Fourth Annual Meeting, held at Boston, February 21 and 22, 1895. Pamphlet, pale blue, 8.7×.2×5.7, pp. 78; 1 portrait. New York: (1895). Albert M. Herr, Secretary.

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Chrysanthemum Society, The National. Annual Report and Financial Statement. Schedule of Prizes for 1895. Pamphlet, pink, 8.3×.1 ×5.4, pp. 58. C. Harman Payne, Foreign Corresponding Secretary.

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Collins, Samuel. Paradise Retriev'd: Plainly and Fully Demonstrating the most Beautiful, Durable, and Beneficial Method of Managing and Improving Fruit-Trees against Walls, or in Hedges, contrary to Mr. Lawrence, and others, upon Gardening. Together with a Treatise on Mellons and Cucumbers. Salmon-colored paper, 7.×.3 ×4.6, pp. v, (7), 5–106; 2 plates. London: 1717. S. F.

Switzer, Stephen. The Practical Fruit-Gardener. Being the Newest and Best Method of Raising, Planting, and Pruning, all sorts of Fruit-Trees, etc., etc. The Second Edition, etc. Half calf, 7.9×1.3×5., pp. (32), 363, (13); 5 plates. London: 1763. S. F.

Brookshaw, George. The Horticultural Repository, containing delineations of the best varieties of the different species of English Fruits; etc., etc. 2 vols. Half calf, 9.7×1.×6.1, pp. 1–96 and 97–199; colored plates 1–50 and 51–104. London: 1823. S. F.

Thacher, James, M. D. The American Orchardist; or a practical treatise on the culture and management of Apple and other fruit trees, etc., etc. Calf, 8.6×.8×5.3, pp. 226. Boston: 1822. S. F.

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(*Canebrake Station*).— Bulletin 18.

ARIZONA.— Bulletins 13 and 14.

ARKANSAS.— Bulletins 31–36.

CALIFORNIA.— Bulletins 105–108. Report for the year 1892–93, and part of 1894.

COLORADO.— Bulletins 29–32. Seventh Annual Report, for 1894.

CONNECTICUT.— (*New Haven Station*).— Bulletins 120 and 121. Spraying Calendar. Eighteenth Annual Report, for 1894.

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DELAWARE.— Bulletins 25–28. Special Bulletin B. Spray Calendar.

FLORIDA.— Bulletins 25–29.

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KENTUCKY.— Bulletins 52–58.

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MARYLAND.— Bulletins 29–36. Seventh Annual Report, for 1894.

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MISSISSIPPI.— Bulletins 32–35. Seventh Annual Report, for 1894.

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MONTANA.— Bulletins 3–6.

NEBRASKA.— Bulletins 37–41. Eighth Annual Report, for 1894.

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NEW MEXICO.—Bulletin 13.

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Oklahoma.— Bulletins 11–13.

Oregon.— Bulletins 32–37.

Pennsylvania.— Bulletins 28–31. Annual Report for 1894.

Rhode Island.— Bulletins 30–32. Sixth and Seventh Annual Reports, for 1893 and 1894.

South Carolina.— Bulletins 19 and 20.

South Dakota.— Bulletins 41–44.

Tennessee.— Bulletins, Vol. 7, Nos. 3 and 4. Report of the Experimental work of the School of Agriculture, Horticulture and Botany of the University of Tennessee for 1881–2. Report of Experimental work at the State Experiment Station and in the School of Agriculture, Horticulture and Botany during the years 1885 and 1886. Seventh Annual Report, for 1894.

Texas.— Bulletins 32–36.

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Virginia.— Bulletins 40–45.

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Wisconsin.— Eleventh Annual Report, for 1893–94.

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All the publications of the United States Department of Agriculture, here acknowledged, were received from Hon. J. Sterling Morton, Secretary of Agriculture.

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Bulletin No. 9. Report on the Use of Metal Road Ties and on Preservative Processes and Metal Tie-plates for Wooden Ties. By E. E. Russell Tratman, A. M. Am. Soc. C. E. [Supplementary to Report on the Substitution of Metal for Wood in Railroad Ties, 1890.] Prepared under the direction of B. E. Fernow, Chief of Division of Forestry. Pamphlet, tea, 9.×.6×5.8, pp. 363; 5 plates. Washington: 1894.

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Contributions from the U. S. National Herbarium. *Vol. I, No. 9.* Issued January 31, 1895. Report on a Collection of Plants made in the states of Sonora and Colima, Mexico, by Dr. Edward Palmer, in the years 1890 and 1891. By J. N. Rose, Assistant Botanist. Half sheep, 9.1×1.6×6.3, pp. v, 293–434; frontispiece, plates 24–35, 10 cuts. Washington: 1895. [With title-page and index.] *Vol. III, No. 4.* Issued November 23, 1895. Report on a collection of plants made by J. H. Sandberg and assistants in northern Idaho in the year 1892. By John M. Holzinger. Pamphlet, tea, 9.5×.2×6.3, pp. v, 205–287, v; 2 plates (III and IV). Washington: 1895.

Circular *No. 3.* The Russian Thistle. Pamphlet, 9.×—×5.8, pp. 8; 3 cuts. (Washington: 1895?) *No. 4.* The Flat Pea. By F. Lamson-Scribner. Pamphlet, 8.9×—×5.8, pp. 7. (Washington: 1895.) *No. 5.* Giant Knotweed, or Sachaline. By F. Lamson-Scribner. Pamphlet, 8.9×—×5.8, pp. 4. (Washington: 1895.)

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Bulletin No. 33. Legislation against Injurious Insects; a compilation of the laws and regulations in the United States and British Columbia. By L. O. Howard, Entomologist. Pamphlet, gray, 9.× .1×5.8, pp. 46. Washington: 1895.

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Bulletin No. 2. Report on Bird Migration in the Mississippi Valley in the years 1884 and 1885, by W. W. Cooke. Edited and revised by Dr. C. Hart Merriam. Dark maroon cloth, 9.2×1.7×6., pp. 313; 1 map. Washington: 1888.

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Bulletin No. 5. The Pocket Gophers of the United States. Prepared under the direction of Dr. C. Hart Merriam, Chief of Division, by Vernon Bailey, Chief Field Agent. Pamphlet, gray, 9.7×.1× 6.2, pp. 47; frontispiece, 6 cuts, 1 map. Washington: 1895.

Bulletin No. 6. The Common Crow of the United States. By Walter B. Barrows and E. A. Schwarz. General Report: Walter B. Barrows. Report on Insect Food: E. A. Schwarz. Pamphlet, gray, 9.×.2×5.8, pp. 98; frontispiece, cuts. Washington: 1895.

Bulletin No. 7. Preliminary report on the Food of Woodpeckers, by F. E. L. Beal, Assistant Ornithologist. The Tongues of Woodpeckers, by F. A. Lucas, Curator Department of Comparative Anatomy, U. S. National Museum. Pamphlet, gray, 9.7×.1×6.3, pp. 39; frontispiece, 3 plates, 4 cuts. Washington: 1895.

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Bulletin No. 21. Methods and Results of Investigations on the Chemistry and Economy of Food. By W. O. Atwater. Pamphlet, tea, 8.9×.4×5.7, pp. 222; 15 cuts. Washington: 1895.

Bulletin No. 22. Agricultural Investigations at Rothamsted, England, during a period of fifty years. Six lectures delivered under the provisions of the Lawes Agricultural Trust, By Sir Joseph Henry Gilbert, M. A., LL. D., F. R. S., etc., under the auspices of the Association of American Agricultural Colleges and Experiment Stations, in November, 1893. Pamphlet, gray, 8.9×.6×5.8, pp. 316; frontispiece, 1 plate, 1 diagram. Washington: 1895.

Bulletin No. 23. Organization Lists of the Agricultural Experiment Stations and Institutions with Courses in Agriculture in the United States. Published by authority of the Secretary of Agricul-

ture. January, 1895. Pamphlet, gray, 8.9×.2×5.7, pp. 88. Washington: 1895.

Bulletin No. 24. Proceedings of the Eighth Annual Convention of the Association of American Agricultural Colleges and Experiment Stations held at Washington, D. C., November 13–15, 1894. Edited by A. C. True, for the Office of Experiment Stations, and H. H. Goodell, for the Executive Committee of the Association. Pamphlet, tea, 8.9×.2×5.8, pp. 98. Washington: 1895.

Bulletin No. 25. Dairy Bacteriology. By H. W. Conn, Ph. D., Professor of Biology in Wesleyan University. Pamphlet, gray. 8.9 ×.1×5.7, pp. 40. Washington: 1895.

Bulletin No. 26. Agricultural Experiment Stations. Their Objects and Work. By A. C. True, Director of the Office of Experiment Stations. Pamphlet, gray, 8.9×—×5.7, pp. 16. Washington: 1895.

United States Department of Agriculture. FARMERS' BULLETINS.

No. 21. Barnyard Manure, by W. H. Beal, of the Office of Experiment Stations. Pamphlet, 9.×—×5.8, pp. 32; 7 cuts. Washington: 1894.

No. 22. The Feeding of Farm Animals. By E. W. Allen, Ph.D., Assistant Director of the Office of Experiment Stations. Pamphlet, 8.9×.1×5.8, pp. 32. Washington: 1895.

No. 23. Foods: Nutritive Value and Cost. By W. O. Atwater, Ph.D. Pamphlet, 9.1×.1×5.8, pp. 32. Washington: 1894.

No. 24. [Bureau of Animal Industry.] Hog Cholera and Swine Plague, by D. E. Salmon, D. V. M., Chief of the Bureau of Animal Industry. Pamphlet, 9.×—×5.8, pp. 16. Washington: 1894.

No. 25. Peanuts: Culture and Uses. By R. B. Handy, of the Office of Experiment Stations. Pamphlet, 9.×—×5.8, pp. 24. Washington: 1895.

No. 26. Sweet Potatoes: Culture and Uses. By J. F. Duggar, of the Office of Experiment Stations. Pamphlet, 9.×—×5.8, pp. 30; 4 cuts. Washington: 1895.

No. 27. Flax for Seed and Fibre in the United States. By Charles Richards Dodge, Special Agent for Fibre Investigations. Pamphlet, 8.9×—×5.7, pp. 16. Washington: 1895.

No. 28. Weeds; and how to kill them. By Lyster H. Dewey, Assistant Botanist. Pamphlet, 8.9×—×5.8, pp. 31; 11 cuts. Washington: 1895.

No. 29. Souring of Milk and Other Changes in Milk Products. Pamphlet, 8.9×—×5.7, pp. 23. Washington: 1895.

No. 30. Grape Diseases on the Pacific Coast. By Newton B. Pierce, Division of Vegetable Physiology and Pathology. Pamphlet, 9.×—×5.8, pp. 15; 3 cuts. Washington: 1895.

No. 31. Alfalfa, or Lucern, (by) Jared G. Smith, Assistant Agrostologist. Pamphlet, 8.9×—×5.8, pp. 23; 3 cuts. Washington: 1895.

No. 32. Silos and Silage. By Charles S. Plumb, B. S. Pamphlet, 8.9×—×5.7, pp. 31; 10 cuts. Washington: 1895.

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Reports of the Statistician. New Series. Nos. 122–132. December, 1894 to November, 1895. 11 pamphlets, tea, 9.1×.1×5.7, pp. 703–778; 1–284, 23, 24, 24, 20, 14. Washington: 1895. [Also] Synopses, etc.

Title-page and Index to Reports of the Division of Statistics, Nos. 101–111 and Supplementary Reports for January, February, and March Reports, 1893. Pamphlet, 8.9×—×5.7, pp. x. Washington: 1894.

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Bulletin No. 1. The World's Markets for American Products. Great Britain and Ireland. pp. 155.

Bulletin No. 2. The World's Products, etc. The German Empire. pp. 91.

Bulletin No. 3. The same. France. pp. 74.

Bulletin No. 4. The same. Canada. pp. 67.

Bulletin No. 5. The same. Netherlands. pp. 76.

Bulletin No. 6. The same. Belgium. pp. 90.

6 pamphlets, gray, 9.×.1–.3×5.8. Washington: 1895.

Circular No. 4. An Example for American Farmers and Dairymen. Pamphlet, 9.3×—×5.9, pp. 3.

Circular No. 5. The Treaty of Shimonoseki between China and Japan of April 17, 1895, and our possibilities of Trade with those Countries. Pamphlet, 9.1×—×5.8, pp. 7.

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DUPLICATE BOOKS FOR SALE.

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Persons desiring any of the above will please address "Librarian Massachusetts Horticultural Society, No. 101 Tremont St., Boston".